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# FINAL
# INTERIM MEASURES/
# INTERIM REMEDIAL ACTION
# IMPLEMENTATION PLAN FOR
# THE ROCKY FLATS INDUSTRIAL AREA

U.S. DEPARTMENT OF ENERGY
Rocky Flats Environmental Technology Site
Golden, Colorado

JUNE 1995

ENVIRONMENTAL RESTORATION PROGRAM



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## LIST OF ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| CADSWES | Center for Advanced Decision Support of Water and Environmental Systems (University of Colorado) |
| CAS | Chemical Abstracts Service |
| CDPHE | Colorado Department of Public Health and Environment |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| COPC | constituent of potential concern |
| CTCS | Chemical Tracking and Control System |
| CU | University of Colorado |
| DD | Decision Document |
| D&D | decontamination and decommissioning |
| DMR | document modification request |
| DOE | U.S. Department of Energy |
| DSS | Decision Support System |
| EG&G | EG&G Rocky Flats, Inc. |
| EHRAV | Electronic Handbook of Risk Assessment Values |
| EPA | U.S. Environmental Protection Agency |
| EPCRA | Emergency Planning and Community Right-to-Know Act |
| ER | Environmental Restoration |
| ERPD | Environmental Restoration Program Division |
| FRERP | Federal Radiological Emergency Response Plan |
| FRMAP | Federal Radiological Monitoring and Assessment Plan |

| | |
|---|---|
| GASP | General Analytical Services Protocol |
| GRRASP | General Radiochemistry and Routine Analytical Services Protocol |
| HEPA | high-efficiency particulate air |
| IA | Industrial Area |
| IAG | Interagency Agreement |
| IHSS | Individual Hazardous Substance Site |
| IM/IRA | Interim Measures/Interim Remedial Action |
| IOU | Integrated Operable Unit |
| IP | Implementation Plan |
| IPP | Integrated Program Plan |
| IRIS | Integrated Risk Information System |
| LIMS | Laboratory Information Management Services |
| NEPA | National Environmental Policy Act |
| NPDES | National Pollutant Discharge Elimination System |
| OU | operable unit |
| PCB | polychlorinated biphenyl |
| PM-10 | particulate matter less than 10 micrometers in diameter |
| QA | quality assurance |
| QC | quality control |
| RAAMP | Radioactive Ambient Air Monitoring Program |
| RASP | Radioanalytical Services Protocol |
| RCRA | Resource Conservation and Recovery Act |

| | |
|---|---|
| RfD | reference dose |
| RFEDS | Rocky Flats Environmental Data System |
| RFETS | Rocky Flats Environmental Technology Site |
| RFFO | Rocky Flats Field Office |
| RTRM | real-time radioactivity monitoring |
| SAAM | Selective Alpha Air Monitor |
| SAR | Safety Analysis Review |
| SARA | Superfund Amendments and Reauthorization Act |
| SEA | Systems Engineering Analysis |
| SF | slope factor |
| SNM | Special Nuclear Material |
| TAL | Target Analyte List |
| TSCA | Toxic Substances Control Act |
| TSP | total suspended particulates |
| UBC | under building contamination |
| USQ | Unreviewed Safety Question Determinations |
| VOC | volatile organic compound |
| WARP | Well Abandonment and Replacement Program |
| WEMS | Waste and Environmental Management System |
| WSRIC | Waste Stream and Residue Identification and Characterization |
| WWTP | wastewater treatment plant |

# 1.0 INTRODUCTION

On November 28, 1994, the Final Industrial Area Interim Measures/Interim Remedial Action (IM/IRA) Decision Document (DD) was approved by the U.S. Environmental Protection Agency (EPA) and the Colorado Department of Public Health and Environment (CDPHE). The Final Industrial Area IM/IRA/DD satisfied the requirements set forth in the Rocky Flats Interagency Agreement (IAG) dated January 22, 1991 (U.S. Department of Energy et al. [DOE] 1991). For preparation of the Industrial Area IM/IRA/DD, the existing environmental monitoring programs in the Industrial Area were reviewed and evaluated and proposed actions were developed for EG&G Rocky Flats, Inc. (EG&G) to enhance current monitoring programs in the Industrial Area for detecting potential contaminant releases from current and future transition activities before migrating beyond the Industrial Area fenceline.

The IM/IRA Implementation Plan (IP) is a management tool that will provide necessary information to the IM/IRA Project Manager and the technical support team necessary to implement the proposed actions. This IP describes the proposed actions, individual responsibilities, and the steps necessary to implement the proposed actions and provides an implementation schedule. In addition, this plan details the implementation of an information networking system (Decision Support System [DSS]) that will be used to disseminate information during verification monitoring and to initiate response actions if necessary.

This IP implements two types of proposed actions: actions related to enhancing current monitoring programs in the Industrial Area and actions related to developing verification monitoring programs for transition activities. Scheduling proposed actions to establish the verification monitoring programs will depend on the transition activity schedules, which are not yet defined by DOE. However, a well-defined schedule has been developed for the IM/IRA proposed actions related to enhancing current monitoring programs. These two types of proposed actions are addressed separately in this plan.

Transition essentially involves decontamination and decommissioning (D&D) activities that relate to the transition of Rocky Flats Environmental Technology Site (RFETS) from a nuclear weapons facility to an environmental technology site. These activities may involve the management of chemicals, waste, and structures to reduce environmental and human health risk. At the RFETS, transition activities are generally defined as post deactivation activities in surplus production buildings. This activity is primarily concerned with decontamination, dismantling, removal, or entombment of surplus nuclear facilities. The primary tasks associated with transition activities are (1) surveillance and maintenance, (2) assessment and characterization, (3) environmental review, and (4) closeout. Activities associated with these tasks include the removal of equipment, piping, tanks, ducts, ceilings, and other internal building structures. In general, it is planned that transition activities will be done in phases, allowing alternative interim use of most buildings before the final decommissioning of the buildings. Examples of transition activities at RFETS include, but are not limited to, (1) Building 779 (Rooms 152 and 154) Pilot Project, and (2) Building 779 (Rooms 415 and 416).

Other types of transition activities are related to site and building remediation and waste/material handling and transfer and include the following:

- removal of chemicals and radioactive materials from buildings;
- removal of fabrication machinery;
- removal of internal ventilation equipment;

- removal and storage of hazardous waste;
- stabilization and transfer of radioactive wastes or other radioactive materials;
- plutonium stabilization (the Integrated Program Plan for Waste Stabilization and Management);
- residue elimination;
- economic conversion; and
- environmental restoration.

Not all transition activities will require verification monitoring of all environmental media. The IM/IRA Project Team will review the transition activity work plans before their initiation, assess the relative environmental risks, and institute the proper level of verification monitoring.

## 1.1 SCOPE AND PURPOSE OF THE IMPLEMENTATION PLAN

The purpose of this IP is to describe how and when the proposed actions presented in the Final IM/IRA/DD will be performed at RFETS. The IP addresses the implementation of two separate but related types of proposed actions. The first type of proposed action involves the enhancements to existing programs to address proposed transition activities at RFETS. These proposed actions were described in Section 11.0 and in the specific media summary sections in the IM/IRA/DD (DOE 1994). The second type of proposed action is the development of a verification monitoring program as outlined in Section 9.0 of the IM/IRA/DD.

The objectives of this IM/IRA/IP are as follows:

- The IM/IRA/IP will be used as a management tool to enable the IM/IRA Project Team to implement the proposed actions as described in the IM/IRA/DD.

- The IM/IRA/IP will contain schedules for implementing the environmental media (i.e., air, surface water, and groundwater) proposed actions. These schedules will assist IM/IRA personnel with anticipating management activities and budget development.

- The IM/IRA/IP will be an easy-to-use reference for IM/IRA personnel while they are developing verification monitoring programs.

- The IM/IRA/IP will discuss how the objectives outlined in the IM/IRA/DD will be instituted to improve the existing RFETS environmental monitoring network in the Industrial Area.

- The IM/IRA/IP will be a dynamic document that will be revised to reflect changes in IM/IRA responsibilities, personnel, technical approaches, and program structure.

## 1.2 INDUSTRIAL AREA IM/IRA PROJECT OVERVIEW

The purpose of the Industrial Area IM/IRA Project at RFETS is to ensure that environmental monitoring is sufficient to detect potential releases to the environment during transition activities. This project is intended to facilitate the environmental programs at RFETS based on DOE's new mission. In addition, the IM/IRA/DD provides a plan to enhance the existing water management programs for waters collected and contained in building footing drains, basements, valve vaults, and sumps. Proposed actions specified in the IM/IRA/DD will facilitate activities in the

Industrial Area that will increase the capability of detecting and preventing potential contaminant releases before they migrate beyond the Industrial Area boundary.

The Industrial Area IM/IRA/DD presents a program that proactively addresses the current and future monitoring requirements for the RFETS Industrial Area. The objective is to maintain a safety net around the Industrial Area to monitor for, protect against, and respond to potential contaminant releases during transition activities. This safety net includes the plant protective systems that are currently in place for the safety and protection of the public and environment. Examples of these protective systems include environmental monitoring, emergency/spill response, emergency preparedness management, work control, employee awareness and training, building safety and alarm systems, transition project safety systems, and project-specific engineered barriers (Figure 1-1).

The major goals of the IM/IRA/DD are as follows:

- Identify contaminant pathways for all environmental media that could transport contaminants from the Industrial Area and evaluate monitoring capabilities at those pathway locations. This will enable any monitoring needs to be identified based on the safety-net objective.

- Review existing RFETS databases and develop a methodology to compile a list of chemicals to monitor (constituents of potential concern [COPCs]) for current and future monitoring activities in the Industrial Area. These activities will result in a more defined list of chemicals in a given location so a cost-effective monitoring program can be established.

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# FIGURE 1-1
## INDUSTRIAL AREA: SUMMARY OF ENVIRONMENTAL PROTECTION PROGRAMS
## INDUSTRIAL AREA IM/IRA/IP
## ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

**INDUSTRIAL AREA ENVIRONMENTAL PROTECTION MANAGEMENT**

**CHEMICAL TRACKING**
- WSRIC
- WEMS
- CTCS
- SEA
- SARA TITLE III

**EMERGENCY RESPONSE**
- EPCRA
- CERCLA
- DOE Orders
- FRERP
- RCRA
- TSCA
- SARA III
- FRMAP

**DECONTAMINATION AND DECOMMISSIONING**
- Transition
- Project Preparation
- Environmental Review
- Subproject Baseline Development
- Facility Characterization
- Engineering
- Implementation Planning
- Decommissioning Operations
- Closeout and Verification
- Post-Operations Activities

**SOIL MONITORING**
- Annual Site Wide
- OU Investigation
- OU Remediation
- Offsite

**SURFACE WATER MONITORING**
- Wastewater Treatment Plant (NPDES)
- Storm Water (NPDES)
- Incidental Water
- Event Related
- Pond Management

**ENVIRONMENTAL RESTORATION**
- IM / IRA
- CERCLA / RCRA
- OU Management
- OU Investigations
- OU Remediation

**GROUNDWATER MONITORING**
- Background
- RCRA
- CERCLA
- Boundary
- Special Purpose

**AIR MONITORING**
- Ambient Radioactive
- Ambient Nonradioactive
- Effluent Emission Radioactive
- Effluent Emission Nonradioactive
- Meteorological

**WORK CONTROL**
- Administrative Controls
- Release Prevention
- Activity-Specific Monitoring
- Pathway Protection
- Work Plan Approval
- Operations Review Committee
- USQ
- SARs

Notes:

CERCLA = Comprehensive Environmental Reponse, Compensation, and Liability Act
CTCS = Chemical Tracking and Control System
D&D = Decontamination and Decommissioning
DOE = U.S. Department of Energy
EPCRA = Emergency Planning and Community Right-to-Know Act
FRERP = Federal Radiological Emergency Response Plan
FRMAP = Federal Radiological Monitoring and Assessment Plan
IM / IRA = Interim Measures / Interim Remedial Action
NPDES = National Pollutant Discharge Elimination System
OU = Operable Unit
RCRA = Resource Conservation and Recovery Act
SAR = Safety Analysis Review
SARA = Superfund Amendments and Reauthorization Act
SEA = Systems Engineering Analysis
TSCA = Toxic Substances Control Act
USQ = Unreviewed Safety Question Determinations
WEMS = Waste and Environmental Management System
WSRIC = Waste Stream Residue Identification and Characterization



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- Conceptualize and develop a future verification monitoring program that complements site-specific transition activity in the Industrial Area. The verification monitoring program is designed to detect potential contaminant releases before the contaminants leave the Industrial Area, promote sufficient planning and coordination, and describe appropriate response actions to be undertaken by representatives from the Industrial Area IM/IRA, transition activity, and emergency response groups.

- Establish statistically based criteria for developing baseline and response action conditions for COPCs to minimize false-positive and false-negative monitoring errors.

- Create a protective and cost-effective verification monitoring program using a combination of the best available real-time monitoring technologies and sample collection instrumentation that would interface with existing RFETS remote sampling and detection systems. This is a cost-effective approach using existing state-of-the-art monitoring programs that are already established in the Industrial Area.

- Evaluate and enhance the current management programs for monitoring incidental water and foundation drain water programs to reduce the potential risk of contaminant transport from the Industrial Area via discharge into the stormwater drainages, wastewater treatment plant (WWTP), or from the onsite wastewater treatment systems in the Industrial Area. Enhancements to these water management programs will allow better monitoring and disposition practices in the Industrial Area.

## 1.3 VERIFICATION MONITORING OVERVIEW

The verification monitoring program is primarily designed to detect chronic releases to the Industrial Area environment from transition activities. As stated earlier, the goal of the verification monitoring program is to detect contaminant releases to the air, groundwater, and surface water before they migrate past the Industrial Area fenceline. The extent and amount of verification monitoring will be a function of the type of transition activity being performed and the risk associated with that particular activity.

It is the purpose of the verification monitoring program to verify that the pathway protection procedures instituted at the transition activity site are operating properly. If releases are detected during the verification monitoring program, preprogrammed response actions (Section 4.0) will be conducted to investigate the releases.

Monitoring results from the verification monitoring program will be compared to a statistically developed baseline specific to each COPC at each sampling site. A site-specific baseline will be established for each of a given set of COPCs before transition activities begin. COPC concentrations that exceed preestablished action limits per sampling site would prompt an action to determine the source of the potential release. These action limits are established using a control-chart approach in which a mean (baseline) is established and two standard deviations from the mean would be the action level for a particular COPC. Refer to Section 3.3.3 for the discussion concerning statistical calculations.

To establish baseline conditions for air, groundwater, and surface water (outfalls), historical data will be used whenever possible once COPCs are established for a particular verification monitoring site. There are situations where additional monitoring that is closer to the potential source areas will be used. For example, surface water will be monitored in the subbasin proximate to the transition activity and will emphasize real-time radiotelemetry monitoring whenever appropriate. For groundwater, temporary well points may be installed and monitored at the transition site.

## 1.4 OVERVIEW OF THE DECISION SUPPORT SYSTEM

The Industrial Area IM/IRA verification monitoring program will be specific to each transition activity. COPCs and the types of pathways that will be monitored will be selected for each activity based on the type of activity and the chemical and physical characteristics of the site. Several phases of transition activity projects at different locations may be conducted simultaneously. If a potential release from an activity is suspected, preprogrammed response actions may be instituted. To assess whether release conditions may be present as a result of activities at a particular transition activity site, personnel that are responsible for instituting these preprogrammed responses need to process, review, and evaluate data from the verification monitoring program.

To assist personnel with the data evaluation, a DSS will be created to manage the verification monitoring data. The DSS is a computer-based information management system that will assist IM/IRA personnel in making management decisions. The DSS technology will be developed by the University of Colorado's (CU) Center for Advanced Decision Support of Water and Environmental Systems (CADSWES). The DSS for the IM/IRA is discussed in detail in Section 4.0.

## 1.5 ORGANIZATION OF THE IMPLEMENTATION PLAN

This IP is composed of the following sections:

- Section 1.0, Introduction. This section discusses the goals, objectives, and background for the Industrial Area IM/IRA/DD and this IM/IRA/IP.

- Section 2.0, Industrial Area IM/IRA Proposed Actions and Implementation Activities. This section describes the proposed actions as specified in the IM/IRA/DD for each medium of concern. The activities necessary to implement these proposed actions are discussed for each medium.

- Section 3.0, Verification Monitoring for Transition Activities. This section provides an overview of the verification monitoring program that will be instituted during transition activities. A step-by-step approach is provided to establish COPCs, develop statistically based action limits, and set up the verification monitoring for all potential media. A schedule is provided that estimates the time necessary to develop and establish a verification monitoring system after a transition activity is scheduled.

- Section 4.0, Decision Support System. This section provides an overview of the DSS that will be developed and instituted during the IM/IRA Project to disseminate monitoring information and to facilitate preprogrammed responses in the event of catastrophic or chronic release.

- Section 5.0, Implementation Plan Responsibilities for Proposed Actions. This section details the specific technical and management responsibilities for key personnel associated with the IM/IRA Project.

- Section 6.0, Implementation Plan Reporting and Revisions. This section describes the reporting requirements for the IM/IRA Project, including monthly status reports and annual reports to EPA and CDPHE. This section also discusses IP revision procedures as required by established quality assurance (QA) protocols.

## 1.6 REFERENCES


U.S. Department of Energy. 1994 (September). *Proposed Interim Measures/Interim Remedial Action Decision Document for the Rocky Flats Industrial Area.* Environmental Restoration Program. Golden, Colorado.

U.S. Department of Energy, U.S. Environmental Protection Agency Region VIII, and the State of Colorado. 1991 (January 22). *Interagency Agreement.* Docket No. 91-01-22-01. Denver, Colorado.

# 2.0 INDUSTRIAL AREA IM/IRA PROPOSED ACTIONS AND IMPLEMENTATION ACTIVITIES

One of the major objectives for the Industrial Area IM/IRA Project is to identify potential contaminant pathways in the Industrial Area. Based on this identification in the IM/IRA/DD (DOE 1994), proposed actions were recommended to enhance the existing environmental monitoring network for current and future transition activities. As mentioned previously, this IP identifies two types of proposed actions: actions related to the enhancement of programs for current nonroutine activities in the Industrial Area and actions related to future transition activities that would require verification monitoring. Establishing the verification monitoring programs will depend on the transition activity schedules, which are not all yet defined by DOE. (Refer to Section 3.0 for verification monitoring details.)

A verification monitoring system to monitor transition activities that may affect groundwater, surface water, and air at RFETS is conceptualized and presented in the IM/IRA/DD. The proposed actions for these potential pathways and an evaluation of the current sitewide monitoring systems are described in Sections 4.0, 5.0, and 6.0 of the IM/IRA/DD. The primary objective of the verification monitoring program is to provide a monitoring system for transition activities that is (1) more comprehensive than the occupational health and safety personnel monitoring network, (2) located close to the activities, and (3) more focused than the existing Industrial Area environmental monitoring programs. The Industrial Area fenceline is the principal point of concern during the verification monitoring program.

The following sections present the proposed actions for groundwater, surface-water, and air monitoring and for incidental-water management. Subtasks for each of these media that correspond to proposed verification monitoring actions, and current program upgrades have been identified and presented in sequential order. The environmental monitoring activities performed under this Industrial Area IM/IRA/IP will be in accordance with established RFETS operating procedures.

## 2.1 PROPOSED ACTIONS FOR GROUNDWATER

For each transition activity site requiring extensive groundwater monitoring, a set of monitoring wells will be identified to detect potential contamination within the upper hydrostratigraphic unit. The monitoring wells will be selected from existing wells and new wells proposed in Section 4.0 of the IM/IRA/DD. This set of wells will monitor the immediate site, both upgradient and downgradient, to distinguish between contamination originating from outside the site and contamination originating directly from the activity. Monitoring wells selected for each site will be located as close as possible to the immediate transition activity site to detect contamination as quickly as possible. Baseline chemical data will be established for each of the existing and newly installed monitoring wells. Baseline data for existing wells will be compiled using quarterly sampling results from 1990. New wells, proposed in the IM/IRA/DD to enhance the current monitoring program by monitoring pathways not currently addressed by the present groundwater monitoring network, will be installed and developed by EG&G. For those newly installed monitoring wells, the baseline data set will be compiled using quarterly groundwater results available at the start of the transition activity. New well locations will be evaluated for ecological impacts before well installations or monitoring activities begin.

### 2.1.1 Groundwater Verification Monitoring

Groundwater verification monitoring includes the following proposed actions:

- Collect Baseline Data for New Wells. After installation, new monitoring wells will be incorporated into the quarterly groundwater sampling program. Before transition activities begin, available results on existing wells (preferably three to five years) will be extracted from the Rocky Flats Environmental Data System (RFEDS), and the mean and action levels will be calculated for COPC concentrations detected in the water from each new well. The quarterly groundwater analytes will constitute the list of COPCs.

- Identify Transition Activities That Will Require Groundwater Monitoring. When a transition activity schedule is available, the activities and procedures will be reviewed and evaluated to determine which activities and locations will require groundwater monitoring. Locations that are identified for groundwater monitoring will be evaluated to select existing and new monitoring wells that are appropriate for inclusion in the verification monitoring program. Well-point locations will be identified near the transition activity based on the configuration of the area, equipment placement, and other physical constraints.

- Collect/Compile Baseline Data for Existing Wells. For existing monitoring wells selected for verification monitoring in the Industrial Area, historical data from quarterly sampling will be extracted from RFEDS. These data will constitute the baseline data set. The mean and action levels for COPC concentrations will be calculated for each existing well. The quarterly groundwater analytes will constitute the list of COPCs.

- Install Temporary Wells. After locations have been identified, temporary well points will be installed near the planned transition activity one year before transition activities, if possible. It is recognized that this may not always be feasible. If activities have already begun, existing nearby wells may be used for monitoring.

- Collect Baseline Data for Well Points. New well points will be incorporated into the quarterly groundwater sampling program after installation. Before transition activities begin, available results will be extracted from RFEDS, and the mean and action levels will be calculated for each COPC at each well location.

- Implement Verification Monitoring Program. If required during the transition activities, groundwater samples will be collected from the monitoring wells selected for the specific verification monitoring program and for any new well points that are installed. These samples will be collected as part of the existing quarterly groundwater sampling program currently in place at RFETS. The sample results will be extracted from RFEDS when they are available and compared with the statistical action-level concentrations.

- Evaluate Data. If the results indicate that sample concentrations are less than action-level concentrations, quarterly sampling and data review will continue throughout the transition activity and after the transition activity to detect a potential release (if it occurred on the last day of the activity). If results indicate that sample concentrations are greater than action-level concentrations, the preprogrammed responses will be implemented.

- Monitor Wells After Transition Activity. Verification monitoring wells and temporary well points will be monitored for at least six months after transition activities are complete.

### 2.1.2 Current Program Upgrades

The following are proposed actions to upgrade the current groundwater monitoring program in the Industrial Area, based on flow path analysis:

- Install Proposed Monitoring Wells. Eleven new monitoring wells will be installed to enhance the current groundwater program in the Industrial Area. Plate 1 shows the proposed locations of the new wells. Well installation will be performed by the 1995 Well

Abandonment and Replacement Program (WARP). Portions of the WARP work plan are included as Appendix A.

- Quarterly Groundwater Sampling. Twenty-five monitoring wells reactivated for the IM/IRA/DD special sampling (November and December 1993) will be monitored quarterly. These monitoring wells are as follows (Plate 1):

| | | | |
|---|---|---|---|
| P213989 | P215789 | 6186 | P313589 |
| 1986 | 2186 | P119389 | P114889 |
| P114789 | P114689 | P115689 | P115589 |
| P115489 | P313489 | P314289 | P416889 |
| P416789 | P419689 | P416689 | P416589 |
| P416289 | P416389 | P416989 | P415889 |
| P114589 | | | |

## 2.2 PROPOSED ACTIONS FOR SURFACE WATER

A pathway analysis for surface-water drainage in the Industrial Area was performed to develop the IM/IRA/DD. Based on referenced information and topographic maps of the Industrial Area, seven major drainage areas were identified. Within these major drainage areas, 26 subbasins were identified in the Industrial Area that ultimately flow to the A, B, and C series pond systems. (Refer to Section 5.0 of the IM/IRA/DD.) These pathways will be monitored for current and future transition activities.

A surface-water monitoring program will be implemented for the Industrial Area that will upgrade the current Industrial Area monitoring program and provide appropriate verification monitoring during transition activities. The monitoring program will include (1) six of the seven pathways for runoff from the Industrial Area, (2) the outfalls of subbasins in which transition activities are taking place that drain into the six pathways, and (3) locations near historically identified contaminated seeps, as necessary. It should be noted that one of the seven pathways is related to the Interceptor Trench System. This pathway is being monitored by Surface Water personnel. The objective of the proposed surface-water verification monitoring program is to monitor transition activities that may affect surface-water quality in the Industrial Area so that appropriate measures can be taken if required. The new monitoring locations will be evaluated for ecological impact before a monitoring station is constructed.

### 2.2.1 Industrial Area Outfall Monitoring

Characterizing surface water as it exits the Industrial Area is a key task for monitoring the effects of transition activities. Because existing monitoring programs were designed to meet specific regulatory objectives, primarily at the RFETS fenceline, the Industrial Area is not adequately equipped to monitor the outflow of surface water in the vicinity of the Industrial Area fenceline. The first tier in the proposed monitoring program is to monitor surface water in the Industrial Area's major drainage pathways (outfalls). The objective of the Industrial Area outfall monitoring program is to characterize surface water leaving the Industrial Area.

Proposed outfall monitoring actions include the following:

- Evaluate Pathways and Outfalls and Determine Appropriate Monitoring Equipment. Within 18 months of approval of the IM/IRA/DD, current Industrial Area outfalls will be identified; appropriate monitoring and sampling equipment for these locations will be procured.

- Establish Baseline Concentrations for the National Pollutant Discharge Elimination System (NPDES) Analyte List Using Available Historical Data. Using results from past and current Industrial Area outfall monitoring stations, baseline concentrations for the NPDES analyte list will be compiled for each outfall in the Industrial Area. Volatile organics and radionuclides will be added to the list of COPC analytes for event-related monitoring at the outfalls.

- <u>Evaluate Technology</u>. New monitoring technologies (e.g., real-time monitoring and sample collection) will be evaluated on an ongoing basis.

- <u>Monitor Culverts</u>. Flow monitoring and sampling capabilities will be implemented at five culvert locations in the southern Industrial Area in addition to the six outfall sampling locations (Plate 2).

- <u>Develop a Monitoring Program for Industrial Area Outfalls</u>. Automated surface-water sampling stations and flow meters will be installed in the six major drainage pathways. These stations will also support the NPDES and event-related monitoring programs. This program will include any necessary baseline data collection and will continue throughout the transition activities. A new real-time monitoring system for radiological constituents will be instituted for surface-water monitoring, if the bench- and pilot-scale testing is successful at RFETS.

### 2.2.2 Subbasin Boundary Monitoring

Twenty-six subbasins in the Industrial Area comprise the six major drainage pathways of concern (Figure 2-1). The objective of the subbasin verification monitoring program is to detect potential releases at the Industrial Area fenceline from transition activities. To support this objective, monitoring near the transition activity may provide the opportunity for early intervention if the activity affects surface water. The second tier of the proposed monitoring program is to equip the subbasins with monitoring equipment to provide the capability of detecting and investigating potential releases closer to potential sources.

Proposed actions for monitoring subbasin boundaries include the following:

- Identify Potential Subbasins to be Monitored and Develop Subbasin COPC Lists. After transition activities are identified, subbasins that will be affected by the transition activity will be determined and COPC lists for potentially affected subbasins will be developed using the methodology presented in Section 3.2.

- Determine Subbasin Monitoring Station Locations. Existing monitoring station locations will be compared with outfalls of the subbasins to determine what subbasins might have been or are currently being monitored. This subtask will ensure that proposed monitoring equipment installation for baseline data collection is not being duplicated. Existing equipment will be inventoried, and additional needs will be assessed and equipment procured. As discussed in Section 5.7 of the IM/IRA/DD, monitoring equipment placement will also be based on the capacity of each subbasin to discharge adequate sample volumes for sample collection and analysis of COPCs.

- Prepare for Monitoring Equipment Procurement and Installation. Flow control structures will be selected and the current radiotelemetry system will be evaluated to determine whether upgrades to the stations are necessary. Appropriate permits will be obtained for all activities.

- Install Verification Monitoring Equipment. Flow control structures will be installed and flow meters, monitoring equipment, and radiotelemetry equipment will be purchased and installed based on the schedule for transition activities.

- Collect Baseline Data. If historical data are not available for specific COPCs, automated samplers may be used to collect data. To establish baseline concentrations, data will be collected for up to 18 months before transition activities begin.

- Review Data. The baseline data will be reviewed, summarized, and evaluated to determine statistical action-limit concentrations of COPCs.

- Implement Verification Monitoring. Once transition activities begin, surface-water verification monitoring will consist of flow-dependent routine manual grab samples, real-time monitoring of water-quality parameters (perennial stream conditions only), surface-water flow, and automated sampling during potential release conditions, as discussed in Sections 5.0 and 9.0 of the IM/IRA/DD.

### 2.2.3 Seeps and Springs

Seeps have been previously identified and observed to discharge into surface-water locations in the Industrial Area, thereby potentially contributing to surface-water contamination. The origins of the seeps are assumed to be primarily from two main sources: groundwater and incidental and foundation waters. There has been considerable sampling and analysis of seeps in the Industrial Area during the past three years. The seeps flow intermittently and predominantly during spring when high groundwater conditions occur or immediately after storm events. It is important to review seep data to determine whether additional monitoring is necessary to identify potential contamination leaving the Industrial Area. Coordination with other projects involving seeps and springs will be performed by Surface Water personnel to reduce the potential of duplication.

Enhancements to the current program for monitoring seeps and springs include the following proposed actions:

- Extract and Review Historical Valid Analytical Data from RFEDS. Data from RFEDS for seep samples and areas of potential contaminant sources will be evaluated. Chemical concentrations will be reviewed for COPC concentrations and their relationship between surface-water and groundwater quality.

- Perform Confirmation Monitoring of Seeps Suspected of Issuing Water with Significant Concentrations of COPCs. Additional sampling of seeps suspected of containing significant concentrations of COPCs may be necessary, if data needs for seeps are discovered during the review of existing data. Confirmation sampling may also be necessary if there is potential for physical (building or topographical) or chemical changes in the seep area.

- Develop and Implement a Seep Monitoring Program. If necessary, a program may be developed to establish seep monitoring locations and frequencies for seeps suspected of issuing water with significant concentrations of COPCs. Locations for monitoring, if needed, will be based on concentrations compared with background surface-water concentrations and historical information. The 1993 Background Geochemical Characterization Report and other surface-water information will be referenced to acquire background information.

- Evaluate Seep Contamination. Analytical data from the seep monitoring program will be evaluated. If seeps are determined to be contaminant sources, they will be investigated further.

- Evaluate Mitigative Measures. Based on the results from the investigation of potential sources of contamination in seeps, mitigative measures will be evaluated to determine their practicality and appropriateness.

## 2.3 PROPOSED ACTIONS FOR AIR

An IM/IRA air monitoring program will be instituted for the Industrial Area to detect potential releases to air during transition activities. The IM/IRA air verification monitoring program will consist primarily of air samplers that are currently part of the extensive plant-wide air monitoring program (located at the Industrial Area fenceline) and five Summa™ canisters colocated with existing particulate samplers at the Industrial Area fenceline to detect volatile organic compounds (VOCs). Sample locations are shown on Plate 2.

The list of COPCs for each transition activity will be determined using the methodology described in Section 3.2 of this IP. Potential airborne COPCs associated with historical use of the buildings and subbasins in the Industrial Area include metals, VOCs, particulates, and radionuclides. Particulate air sampling will include total suspended particulates (TSP) and particulates less than 10 micrometers in diameter (PM-10). Although there are existing air monitoring programs to detect particulate and radiological releases at the Industrial Area fenceline, environmental measurements of VOC and metal concentrations in air have not been made routinely in the Industrial Area. Collection of air quality samples is proposed both before transition activities begin, to establish baseline concentrations of potential contaminants, and after transition activities begin, to support the verification monitoring program.

The air monitoring program will include the following proposed actions:

- Develop COPC List. The types of transition activities will be reviewed to determine a COPC list that will require baseline data collection. The COPCs will be identified using the methodology presented in Section 3.2.

- Prepare/Procure Equipment and Review Methods. Summa™ canisters now in storage at RFETS will be inspected to determine whether any additional canisters will be required for baseline and verification monitoring. EPA analytical methods will be reviewed for COPCs. Sampling personnel will be trained to use the canisters, if necessary. Laboratory personnel will review the analytical methods and associated QA procedures. All monitoring equipment will undergo an operational check before collection of baseline data begins.

- Install Summa™ Canisters. Summa™ canisters will be installed at the five Radioactive Ambient Air Monitoring Program (RAAMP) sites. VOCs will be sampled at these locations (Plate 2).

- Collect Baseline Data. At the five Summa™ canister locations on the Industrial Area fenceline specified previously and at new RAAMP sampler locations, samples will be collected to compile a baseline data set. Baseline data will be collected for at least one year. Data will be validated as data sets become available.

- Review Data. The baseline data will be reviewed, summarized, and evaluated to determine statistical action-level concentrations for COPCs. Recommendations for additional samplers will be made if there is a need.

- Review Release Detection Resources. Computer models will be evaluated to determine capabilities for release detection, plume migration simulation, and availability, if applicable.

- Implement Verification Monitoring. Verification samples will be collected periodically during routine operating conditions to verify that the environmental protection systems are functioning as designed. If COPCs are detected above action-level concentrations, results from verification monitoring will be used to help determine whether any releases to air have occurred as a result of transition activities.

- Reduce Effluent Beryllium Monitoring. Effluent beryllium monitoring will be reduced until a transition activity plan is developed that designates beryllium as a COPC.

## 2.4 INCIDENTAL AND FOUNDATION DRAIN WATERS PROPOSED ACTIONS

Incidental and foundation drain waters may potentially become contaminated from contact with hazardous materials in buildings, IHSSs, other historical release areas, or contamination from under the buildings. In some areas it may be necessary to collect and treat these waters before they enter the environment.

### 2.4.1 Monitoring of Incidental and Foundation Drain Waters

The following proposed actions have been identified to enhance the current monitoring program for incidental and foundation drain waters in the Industrial Area:

- Characterize Drain Discharges. Characterize discharges of all known incidental and foundation drain waters that discharge directly to surface waters; institute disposition criteria.

- Verify Sump Discharge Destinations. The sump discharge flow paths will be verified.

- Sample Foundation Drains and Measure Flow Rates. Selected foundation drains will be monitored quarterly for flow and water quality. Foundation drain monitoring may be conducted in accordance with the OU8 Technical Memorandum No. 1 (EG&G 1994) when this document is finalized.

- Append the *Control and Disposition of Incidental Waters* (EG&G 1993) Document. The *Control and Disposition of Incidental Waters* document will be appended to include a more detailed analyte list for characterization of valve vault water.

- Revise Field Documentation Procedure. The field documentation procedure for sampling and monitoring will be revised to include dates, volumes, water-quality parameters, and flow. The revised procedure will also specify that field documents will be managed in a document control system.

### 2.4.2 Disposition of Incidental and Foundation Drain Waters

Based on the current RFETS treatment facilities discussed in Section 7.4 of the IM/IRA/DD, the following subtasks have been identified to address the disposition of incidental and foundation drain waters:

- Evaluate Pretreatment Technologies. Based on the COPC concentrations anticipated from specific buildings, evaluations of pretreatment technologies will be conducted in concert with any modifications planned for the various water treatment systems.

- Implement Pretreatment Technologies. Based on the evaluation of pretreatment technologies and types of COPCs, appropriate pretreatment technologies may be implemented, as necessary.

- Prepare Procedures for Routing Incidental Waters to the Appropriate Treatment Facility. Procedures will be prepared for determining which incidental waters require treatment and the logistics of routing incidental waters to the appropriate treatment facilities.

- Implement Incidental-Water Treatment. After incidental and foundation drain waters have been characterized, they will be routed through the appropriate treatment facility, as necessary.

## 2.5 DESCRIPTION OF IMPLEMENTATION ACTIVITIES

This section discusses the EG&G activities necessary to initiate and implement the proposed actions as described in Section 2.1. Implementation activities for groundwater, surface water, air, and incidental and foundation drain waters will be addressed in this section. Flowcharts that show the logical progression of activities are also presented in this section. Schedules for implementing the proposed actions are provided in Section 2.6 of this IP.

### 2.5.1 Implementation Activities for Groundwater

Most of the proposed actions for groundwater are associated with installing and monitoring 11 new wells in the Industrial Area. Locations for these wells were selected based on the analysis of groundwater flow paths in the Industrial Area and the ability to detect potential groundwater contamination before it migrates beyond the Industrial Area fenceline. These 11 new wells will be constructed during the 1995 WARP as mentioned in Section 2.1.2. Portions of the 1995 WARP work plan are provided in Appendix A.

#### 2.5.1.1 Construct and Monitor New Wells

The following paragraphs describe the actions necessary to drill, develop, and sample the 11 new wells (Plate 1) in the Industrial Area and to reincorporate 25 monitoring wells (sampled for the IM/IRA Project) into the quarterly groundwater monitoring program. Figure 2-2 is a flowchart showing the sequence of activities.

# FIGURE 2-2
# GROUNDWATER MONITORING: FLOWCHART OF IP ACTIVITIES
# INDUSTRIAL AREA IM/IRA/IP
# ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

## NEW MONITORING WELLS

PROCUREMENT OF SUBCONTRACTORS COORDINATE WELL PLACEMENT WITH OU MANAGERS

↓

DEVELOP FINAL WORK PLAN AND HEALTH AND SAFETY PLAN

↓

LOCATE AND FIELD CLEAR WELL SITES

↓

CONTRACTOR MOBILIZATION IN INDUSTRIAL AREA

↓

INSTALLATION/DEVELOPMENT OF 11 NEW MONITORING WELLS

↓

CONTRACTOR DEMOBILIZATION

↓

SAMPLE 11 NEW WELLS QUARTERLY

↓

DATA EVALUATION/ REPORT CONCLUSIONS

## REESTABLISHMENT OF 25 IA MONITORING WELLS

EVALUATE 1993 IM/IRA DATA

↓

INCORPORATE 25 WELLS INTO ROUTINE QUARTERLY MONITORING PROGRAM

↓

EVALUATE GROUNDWATER MONITORING DATA/REPORT RESULTS

↓

ASSESS CONTINUED MONITORING NEEDS

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This task includes the following activities:

- Procuring subcontractors to drill, install, and develop new wells.

- Coordinating with OU Managers to aid in identifying groundwater well locations that will complement the OU investigations.

- Developing the work plan and the health and safety plan for the 1995 WARP and obtaining DOE approval.

- Coordinating mobilization of drillers who will construct, develop, and sample wells in the Protected Area of the Industrial Area.

- Clearing utilities and coordinating work to be performed in the Protected Area with EG&G Security.

- Surveying well coordinates after well installation and development activities.

- Demobilizing subcontractors after objectives of the WARP have been achieved.

#### 2.5.1.2 <u>Monitor the Existing 25 Monitoring Wells</u>

The existing 25 monitoring wells in the Industrial Area (Plate 1) will be monitored as follows:

- Groundwater Monitoring personnel will evaluate groundwater data collected during the November/December 1993 special sampling.

- Groundwater Monitoring personnel will incorporate the 25 monitoring wells into the routine compliance monitoring program. Those wells that indicate elevated concentrations of COPCs after one year of sampling will be monitored on a quarterly basis.

- The quarterly data will be reviewed after a year of monitoring. Trends, relative concentrations, and hydrogeologic analysis will be evaluated to determine the need for continued sampling.

- Groundwater Monitoring personnel will discuss the quarterly monitoring results and recommendations with the IM/IRA Project Manager.

### 2.5.2 Implementation Activities for Surface Water

Two types of proposed actions are associated with the surface-water medium: monitoring seeps and springs and establishing outfall monitoring stations in the Industrial Area. Both these monitoring program enhancements are part of the future verification monitoring approach and are critical for detecting contamination before it migrates beyond the Industrial Area boundary.

Seeps have been identified and observed to discharge potentially elevated concentrations of chemicals into Industrial Area surface water. The origin of the seeps and springs is primarily from groundwater, incidental waters, and foundation waters. These seeps and springs represent potential source areas whereby contamination may migrate from the Industrial Area.

To detect contaminant releases before they migrate beyond the Industrial Area, it is necessary to reestablish monitoring stations under the Event Related Monitoring Program. Six surface-water monitoring stations will be established to monitor surface water during storm or unusual flow events. In addition, five monitoring stations will be established at culverts in the south portion of the Industrial Area.

As discussed in the IM/IRA/DD, RFETS is constantly reviewing and assessing new monitoring technologies for all environmental media. RFETS will be developing a new real-time radioactivity monitoring (RTRM) capability to detect radionuclides in water. The activities necessary to develop this new monitoring technology are described in this section. The development of this new radioactivity monitoring was not proposed in the IM/IRA/DD. The Project Plan for the RTRM of the Industrial Area is provided in Appendix B.

#### 2.5.2.1 Seep and Spring Monitoring

Existing water quality data from seeps and springs will be extracted from RFEDS and reviewed. Considerable seep and spring data already exist for the Industrial Area. Data will be technically reviewed to determine chemical concentrations and areas of potential contaminant sources.

Surface Water personnel will assess the quality of the data, their completeness, and the coverage of the known seeps and springs in the Industrial Area. Data gaps for seeps and springs will be identified and additional data needs (i.e., additional sampling) will be determined.

Based on the evaluation of historical data, seeps and spring locations may discharge high concentrations of chemicals onto the land surface or into a surface-water drainage. Potential sources of contamination of the seeps and springs will be evaluated and investigated. Data from OU12's sediment and surface-water sampling project will be compared with the historical data.

Surface Water personnel will develop an interim report summarizing and interpreting the historical seep and spring information. Additional data needs will be assessed. The report will consist of maps, data analysis, discussion of findings, and recommendations for additional monitoring.

If additional monitoring (routine or confirmation sampling) of seeps and springs is needed, a work plan detailing the objectives of the monitoring projects and technical approach will be developed. The seep and spring monitoring will be implemented after the work plan has been approved. An ecological assessment of the proposed monitoring stations will be performed before sampling. Data from the seep and spring monitoring program will be reviewed to determine potential contaminant sources (e.g., foundation drains, IHSSs).

Based on the results of the investigation of potential sources, mitigation measures will be evaluated and instituted to eliminate contaminant sources from entering seeps and springs and being discharged outside the Industrial Area.

Seeps and springs will no longer need to be monitored when (1) the source area is removed and no longer affects the seeps or springs and (2) water quality in the seeps and springs has reached an acceptable concentration or risk level.

The IP activities for seeps and springs are shown in Figure 2-3.

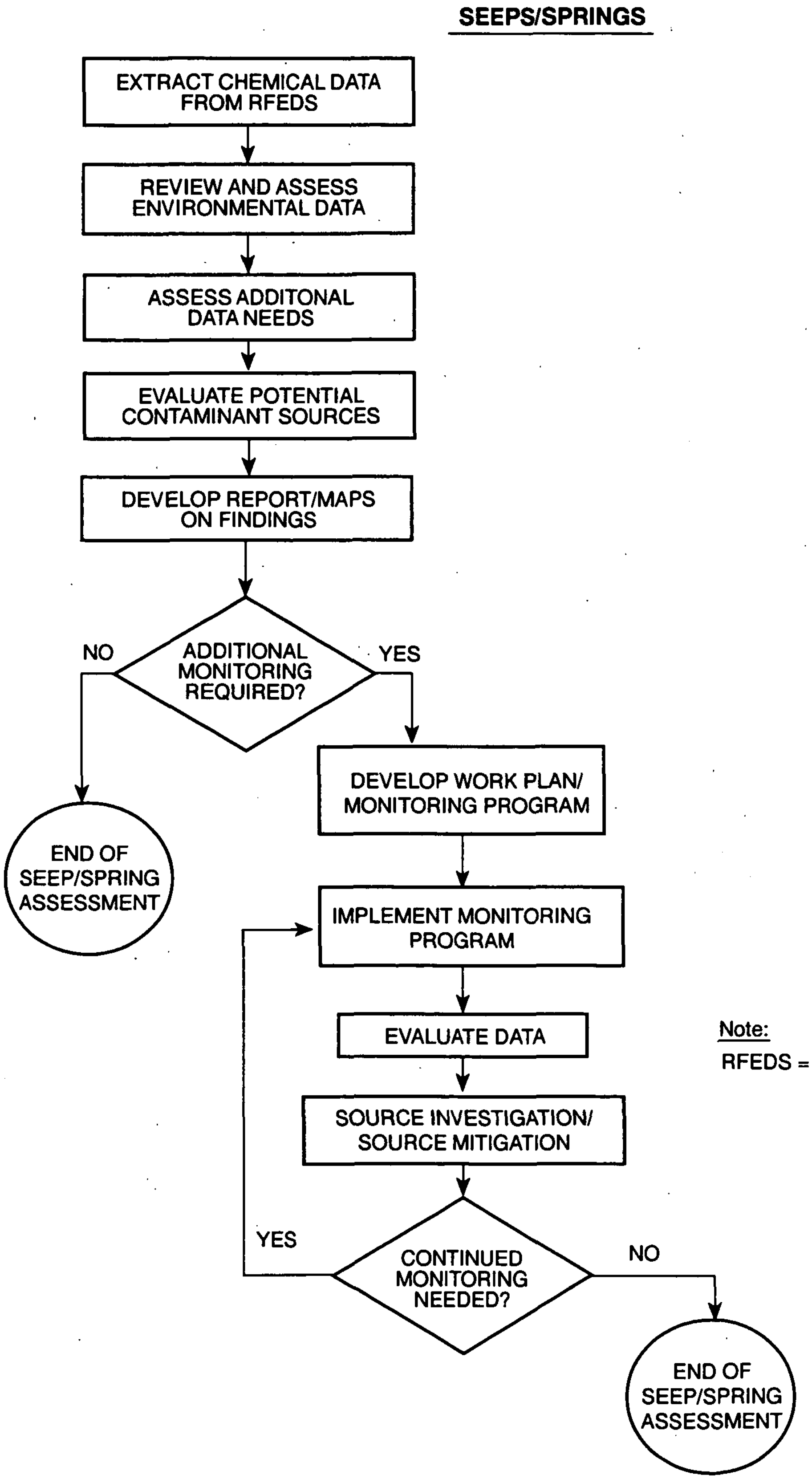
#### 2.5.2.2 Outfall and Culvert Monitoring

Monitoring outfalls and culverts includes the following activities:

- Evaluate monitoring equipment (sampling and stream flow) needs for outfalls and culvert locations.

- Obtain approval of the Surface-Water Monitoring Technical Design Document (draft) (Appendix C).

# FIGURE 2-3
## SURFACE-WATER MONITORING: FLOWCHART OF IP ACTIVITIES
## INDUSTRIAL AREA IM/IRA/IP
## ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE




Note:
RFEDS = ROCKY FLATS ENVIRONMENTAL DATA SYSTEM

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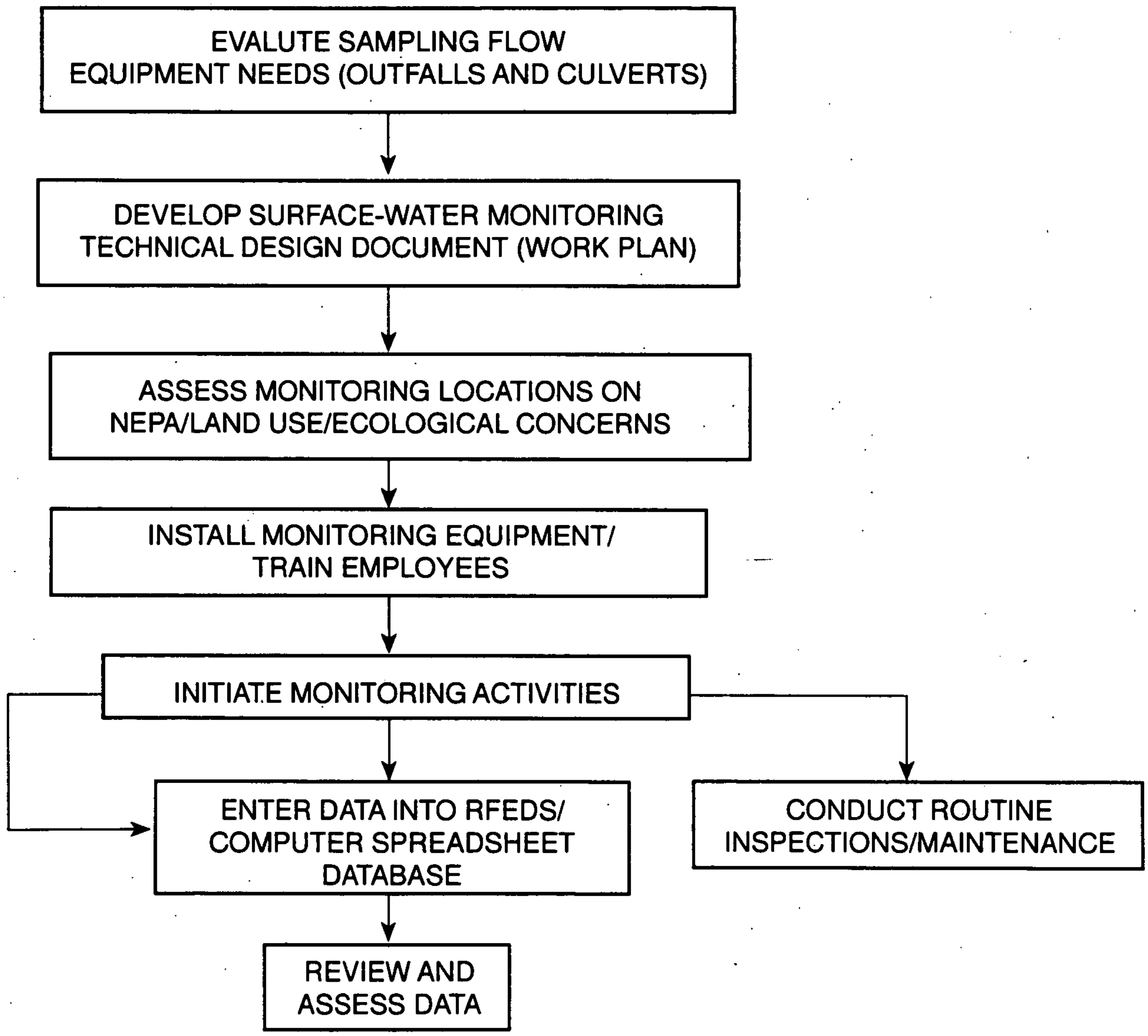
- Develop EG&G Procurement packages to obtain the necessary monitoring equipment.
- Assess land use and ecological impacts from constructing and maintaining monitoring stations.
- Obtain concurrence from ecological and National Environmental Policy Act (NEPA) representatives before installing monitoring equipment.
- Install monitoring equipment at the six outfall and five culvert locations.
- Train employees to collect samples in accordance with EG&G established operating procedures.
- Initiate surface-water monitoring activities and perform laboratory analyses in accordance with the Surface-Water Monitoring Technical Design Document. Maintain analytical data in RFEDS and download flow data periodically into computer spreadsheets.
- Periodically, review and assess the data (Surface Water personnel).
- Conduct routine inspections and preventive maintenance of the surface-water monitoring equipment.

IP activities for outfall and culvert monitoring are shown in Figure 2-4.

# FIGURE 2-4
## SURFACE-WATER MONITORING: FLOWCHART OF IP ACTIVITIES
## INDUSTRIAL AREA IM/IRA/IP
## ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

**OUTFALL AND CULVERT MONITORING STATIONS**




Notes:

NEPA = National Environmental Policy Act
RFEDS = Rocky Flats Environmental Data System

### 2.5.2.3 Real-Time Radioactivity Monitoring

RTRM includes the following activities:

- Establish RTRM needs and requirements based on research literature and assessment of the technology.

- Develop a project plan for RTRM for the Industrial Area and obtain project approval.

- Prepare the RTRM system technical design document to describe the technical basis and design of the RTRM system.

- Formalize the RTRM system design, procure components, and assemble and integrate system components into the RTRM prototype.

- Test the prototype RTRM system in a laboratory environment, evaluate the prototype system performance, and design system improvements while integrating radiotelemetry capabilities.

- Coordinate and install the RTRM system in the field for demonstration.

- Train personnel to operate the system and conduct preventive maintenance.

- Develop the final RTRM report.

The sequence of steps for real-time radioactivity monitoring is shown in Figure 2-5 and is discussed further in Appendix C.

### 2.5.3 Implementation Activities for Incidental and Foundation Drain Waters

The IM/IRA/DD evaluated the management practices of the treatment and ultimate disposition of incidental and foundation drain waters. Proposed actions were developed to enhance the current program management of these types of waters in the Industrial Area. The primary recommendation was to characterize the water quality and flow of incidental and foundation drain waters and to use the three-tier disposition plan (surface-water discharge, sanitary sewer discharge, or onsite treatment).

The objective of managing the incidental and foundation drain waters is to characterize water quality and flow conditions and protect surface-water quality. Based on the results from the IM/IRA/DD, it is possible that waters containing elevated concentrations of chemicals are being discharged to surface-water drainage and ultimately to the pond systems. Incidental and foundation drain waters will be characterized according to the acceptance criteria associated with the three-tiered approach (direct surface-water discharges, sanitary sewer discharge, or onsite treatment). The IM/IRA/DD described the characterization parameters to assess disposition strategies for incidental and foundation drain waters generated at RFETS.

The following are the proposed actions to implement incidental and foundation drain waters management, as shown in Figure 2-6:

- Develop a work plan that details the implementation strategy and actions for incidental and foundation drain waters management that were presented in the IM/IRA/DD.

**FIGURE 2-5**
**SURFACE-WATER MONITORING:**
**REAL-TIME RADIOACTIVITY MONITORING IP ACTIVITIES**
**INDUSTRIAL AREA IM/IRA/IP**
**ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE**

ESTABLISH RTRM TECHNOLOGY REQUIREMENTS/TECHNICAL ASSESSMENT OF METHODOLOGY

↓

RTRM PROJECT PLAN DEVELOPMENT/APPROVAL

↓

PREPARE RTRM TECHNICAL DESIGN DOCUMENT

↓

DEMONSTRATE/REFINE RTRM SYSTEM

↓

RTRM FIELD DEMONSTRATION - INSTALL, INTEGRATE, AND CALIBRATE RTRM SYSTEM

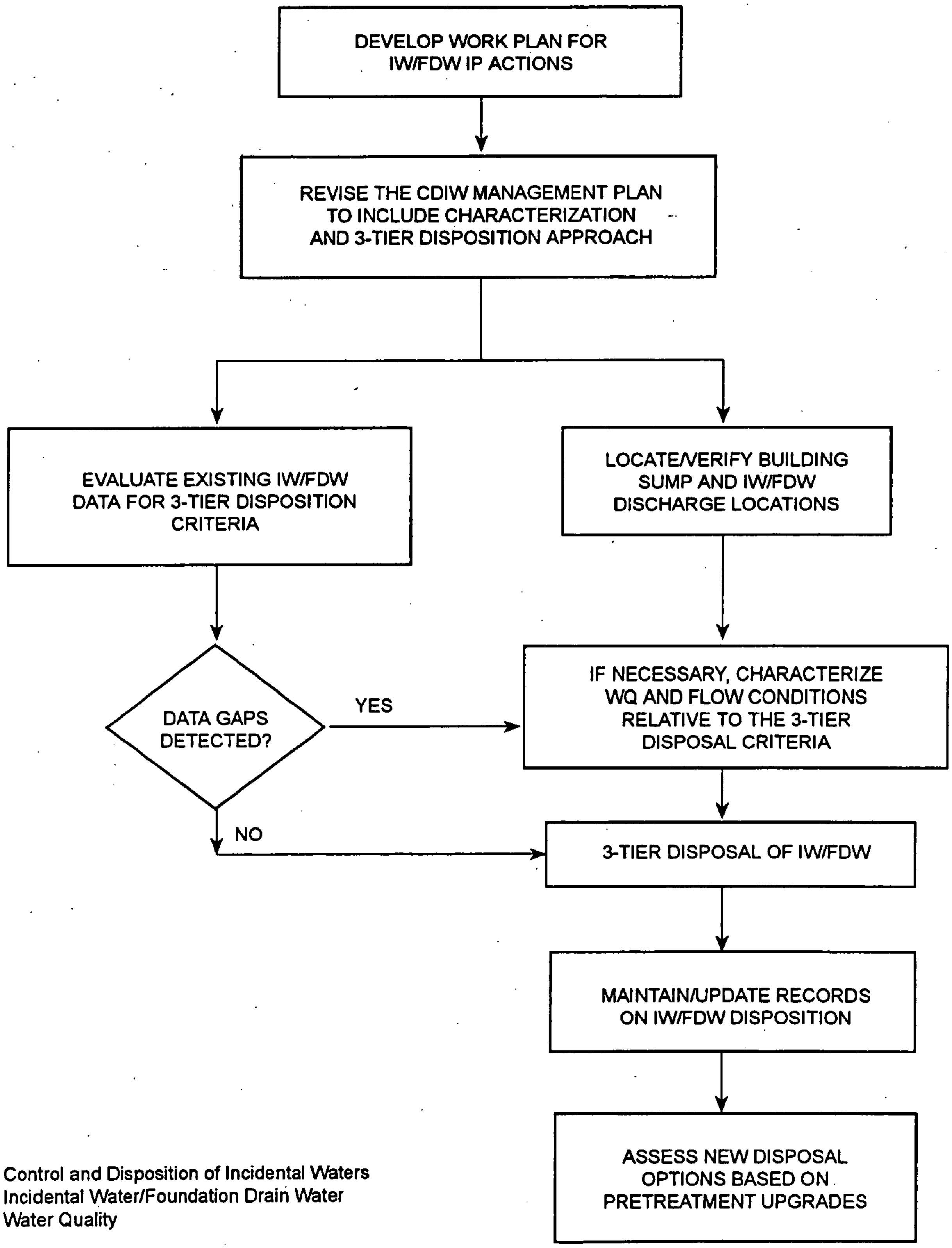
↓

DEVELOP FINAL RTRM REPORT

Note:

RTRM = Real-Time Radioactivity Monitoring

# FIGURE 2-6
## INCIDENTAL/FOUNDATION DRAIN WATER: FLOWCHART OF IP ACTIVITIES
## INDUSTRIAL AREA IM/IRA/IP
## ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE




Notes:

CDIW = Control and Disposition of Incidental Waters
IW/FDW = Incidental Water/Foundation Drain Water
WQ = Water Quality

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- Revise the *Control and Disposition of Incidental Waters* (EG&G 1993) document to include expanded characterization requirements that are associated with the three-tier disposition and acceptance criteria. A prerequisite to this activity is that the existing onsite treatment units must agree to receive the wastewater generated at RFETS based on acceptance criteria and operational constraints.

- Assess the historical incidental and foundation drain water quality and flow data against the three-tiered disposition and acceptance criteria. Address data needs by additional characterization sampling and flow monitoring.

- Verify discharge points in the field from the building sumps and incidental and foundation drain waters and review historical data to decide whether adequate water quality characterization and flow data exist to determine if the water meets the three-tier disposition criteria.

- Based on the field evaluation and historical data assessment, determine whether additional water quality and flow monitoring activities will be necessary to comply with the three-tier disposal approach.

- Establish new disposition practices for incidental and foundation drain waters based on characterization data.

- Update and maintain records of incidental and foundation drain water characterization, monitoring, and ultimate disposition.

- Continually assess disposal options for upgrading pretreatment onsite.

### 2.5.4 Air Implementation Activities

Significant air program upgrades were already planned before developing the IM/IRA/DD. These changes included upgrading the RAAMP and installing nonradioactive ambient monitoring (using Summa™ canisters) for VOCs and selected metals.

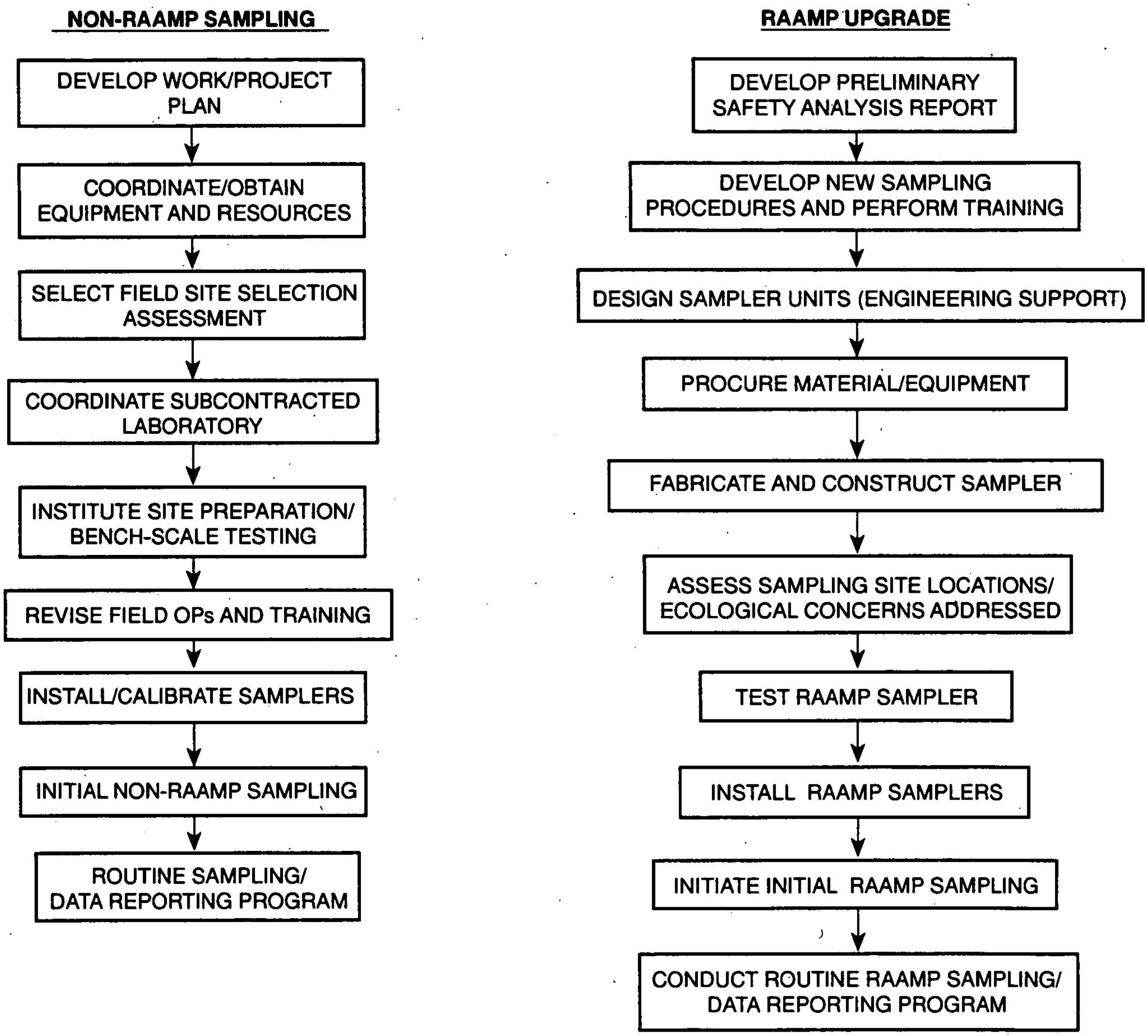
#### 2.5.4.1 Program Upgrade for Monitoring Ambient Levels of Radionuclides in Air

The following actions will implement the proposed actions in the IM/IRA/DD for RAAMP as shown in Figure 2-7:

- Develop preliminary safety analysis report and work and project plans.
- Acquire engineering support to design high-volume RAAMP samplers and sampling stations.
- Acquire material and sampling equipment through the Procurement Department.
- Support RAAMP sampler engineering and fabrication.
- Conduct ecological and NEPA assessments of proposed RAAMP sampling sites.
- Assemble and test RAAMP to assess operation of sampler units.
- Install new high-volume RAAMP samplers in the field.
- Perform initial sampling, if necessary, and change procedures and equipment in the field.
- Incorporate the upgraded RAAMP into the routine sampling and data reporting program.

Final

## FIGURE 2-7
## AIR MONITORING: FLOWCHART OF IP ACTIVITIES
## INDUSTRIAL AREA IM/IRA/IP
## ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE




Notes:

RAAMP = Radioactive Ambient Air Monitoring Program
OP = Operating Procedures

All RAAMP upgrades were completed in January 1995.

### 2.5.4.2 Nonradioactive Ambient Air Monitoring Program Development

The following tasks will implement the proposed actions in the IM/IRA/DD for non-RAAMP monitoring:

- Develop work and project plans (Air Quality personnel).
- Obtain resources and procure equipment for air sampling.
- Assess field locations at RFETS and establish locations for air sampler and Summa™ canister installations, using existing RAAMP locations that have electrical power utility whenever possible.
- Assign subcontractor laboratory for the non-RAAMP monitoring program.
- Prepare selected air sampling locations and install air samplers; perform bench-scale testing on operational efficiency of air sampler prototype in laboratory setting.
- Revise established RFETS air sampling operating procedures to address nonradioactive parameters.
- Train employees in the new sample collection procedures.
- Install and calibrate air samplers in the field.
- Install the Summa™ canisters in the air sampling system.

- Perform initial sampling of the nonradioactive parameters (VOCs).
- Make final instrumentation and procedural changes based on the initial sampling event.
- Sample VOC locations on a routine basis.

## 2.6 IMPLEMENTATION SCHEDULE FOR IM/IRA PROPOSED ACTIONS

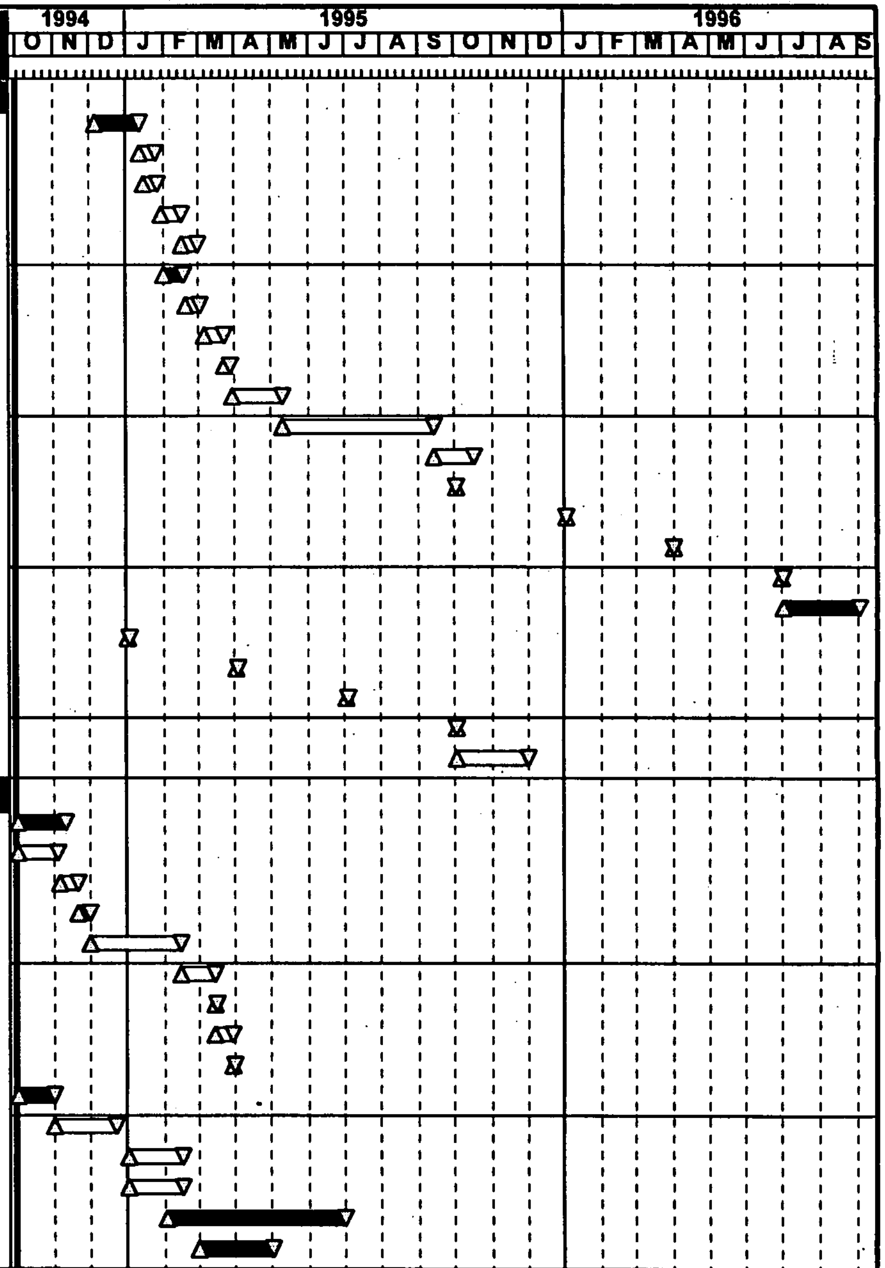
A critical part of the IM/IRA/IP is to develop and maintain the implementation schedules for proposed actions. Most of the proposed actions will be performed for the IM/IRA Project Manager by various technical support entities. For example, these entities will include Surface Water personnel (surface-water and incidental and foundation drain water actions), Air Quality personnel, Groundwater Monitoring personnel, and other technical support groups at RFETS.

Schedules are a management tool to track project progress and cost. Schedules will be updated and revised periodically based on project status reports and meetings by the technical support team.

### 2.6.1 Description of Proposed Action Schedules

Figure 2-8 shows the working schedules to implement the IM/IRA proposed actions. The schedules are presented in Gantt Chart form, describing activities, start dates, end dates, durations and activity bars. Activities have been developed in a logical and sequential order. These schedules are more detailed than the general schedule provided in the IM/IRA/DD. Specific schedules are provided for proposed actions for groundwater, surface water, air monitoring, and foundation drain and incidental waters.

| Activity ID | Activity Description | Early Start | Early Finish |
|---|---|---|---|
| **GROUNDWATER (WELL INSTALLATION)** | | | |
| 01-01 | DEVELOP/REVISE DRAFT WARP WORKPLAN | 07DEC94* | 11JAN95 |
| 01-02 | E G & G REVIEWS DRAFT WARP WORK PLAN | 12JAN95 | 25JAN95 |
| 01-03 | DOE REVIEWS DRAFT WARP WORK PLAN | 16JAN95 | 27JAN95 |
| 01-04 | INCORPORATE COMMENTS/FINALIZE WORK PLAN | 30JAN95 | 16FEB95 |
| 01-05 | DOE/EG&G REVIEW/APPROVAL OF FINAL WORK PLAN | 17FEB95 | 01MAR95 |
| 01-06 | DEVELOP/REVISE DRAFT H & S PLAN | 02FEB95* | 17FEB95 |
| 01-07 | E G & G REVIEWS DRAFT H & S PLAN | 20FEB95 | 03MAR95 |
| 01-08 | INCORPORATE COMMENTS/FINALIZE H & S PLAN | 06MAR95 | 23MAR95 |
| 01-09 | APPROVAL OF FINAL H & S PLAN | 24MAR95 | 27MAR95 |
| 01-10 | FIELD COORDINATION ACTIVITIES | 30MAR95 | 10MAY95 |
| 01-11 | WELL INSTALLATION ACTIVITIES | 11MAY95 | 13SEP95 |
| 01-12 | SURVEYING/DEMOBILIZATION | 14SEP95 | 17OCT95 |
| 01-13 | QUARTER 1 MONITORING WELL SAMPLING | 02OCT95* | 02OCT95 |
| 01-14 | QUARTER 2 MONITORING WELL SAMPLING | 02JAN96* | 02JAN96 |
| 01-15 | QUARTER 3 MONITORING WELL SAMPLING | 01APR96* | 01APR96 |
| 01-16 | QUARTER 4 MONITORING WELL SAMPLING | 01JUL96* | 01JUL96 |
| 01-17 | EVALUATE MONITORING WELL DATA | 02JUL96 | 03SEP96 |
| 01-18 | E G & G SAMPLING 25 IM/IRA WELLS QTR 1 | 03JAN95* | 03JAN95 |
| 01-19 | E G & G SAMPLING 25 IM/IRA WELLS QTR 2 | 03APR95* | 03APR95 |
| 01-20 | E G & G SAMPLING 25 IM/IRA WELLS QTR 3 | 03JUL95* | 03JUL95 |
| 01-21 | E G & G SAMPLING 25 IM/IRA WELLS QTR 4 | 02OCT95* | 02OCT95 |
| 01-22 | EVALUATE 25 IM/IRA WELLS DATA | 03OCT95 | 01DEC95 |
| **SURFACE WATER** | | | |
| 02-01 | DEVELOP SURFACE WATER IMPLEMENTATION WORK | 03OCT94* | 11NOV94 |
| 02-02 | EVALUATE EQUIPMENT NEEDS | 03OCT94 | 04NOV94 |
| 02-03 | DEVELOP/DELIVER PROCUREMENT PACKAGES | 07NOV94 | 21NOV94 |
| 02-04 | NEPA/LAND USE/ECOLOGICAL IMPACT ASSESSMENT | 22NOV94 | 30NOV94 |
| 02-05 | PROCURE EQUIPMENT/FIELD COORDINATION | 01DEC94 | 13FEB95 |
| 02-06 | INSTALL SAMPLERS, FLOW CONTROLS, METERS | 14FEB95 | 14MAR95 |
| 02-07 | COMPLETE STATION INSTALLATIONS | 15MAR95 | 15MAR95 |
| 02-08 | COORDINATE MONITORING PROGRAM | 15MAR95 | 29MAR95 |
| 02-09 | INITIATE MONITORING STATIONS | 30MAR95 | 30MAR95 |
| 02-10 | EXTRACT SEEP/SPRING DATA FROM RFEDS | 03OCT94* | 01NOV94 |
| 02-11 | DATA REDUCTION AND ASSESSMENT | 02NOV94 | 22DEC94 |
| 02-12 | ASSESS POTENTIAL CONTAMINANT SOURCES | 03JAN95 | 15FEB95 |
| 02-13 | PRODUCE MAPS/PLATES | 03JAN95 | 15FEB95 |
| 02-15 | ASSESS NEED FOR ROUTINE MONITORING/REPORT | 03FEB95* | 30JUN95 |
| 02-16 | DESIGN MONITORING WORK PLAN | 01MAR95* | 01MAY95 |




Project Start 01OCT94
Project Finish 03SEP96
Data Date 01OCT94
Plot Date 22JUN95

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Progress Bar
Critical Activity

IMPL

Sheet 1 of 2

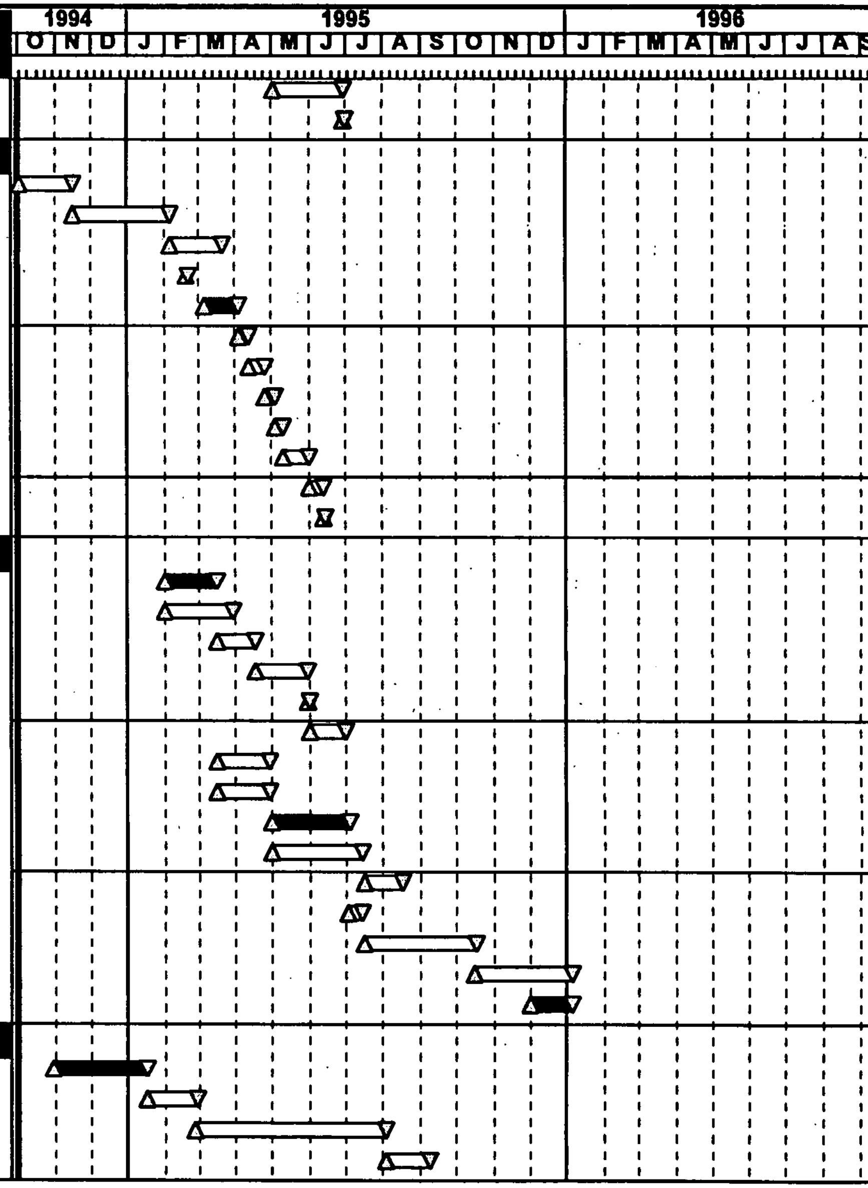
FIGURE 2-8
PROPOSED-IMPLEMENTATION SCHEDULE
ROCKY FLATS ENVIRONMENTAL TECH. SITE

| Date | Revision | Checked | Approved |
|---|---|---|---|
| | | | |



55

| Activity ID | Activity Description | Early Start | Early Finish |
|---|---|---|---|
| 02-17 | EQUIPMENT PROCUREMENT/COORDINATION | 02MAY95 | 29JUN95 |
| 02-18 | INITIATE MONITORING PROGRAM | 30JUN95 | 30JUN95 |
| **AIR MONITORING** | | | |
| 03-01 | VOC PROJECT AUTHORIZATION/WORK PLAN | 03OCT94 | 15NOV94 |
| 03-02 | SITE COORD/VERIFICATION/REVISE FIELD OPS | 16NOV94 | 06FEB95 |
| 03-03 | EQUIPMENT PROCUREMENT/SITE PREP | 07FEB95 | 20MAR95 |
| 03-04 | BENCH SCALE TEST | 20FEB95* | 20FEB95 |
| 03-05 | EQUIPMENT PREP/FIELD TRAINING | 06MAR95* | 03APR95 |
| 03-06 | INSTALL SAMPLERS #1 & #2 | 04APR95 | 12APR95 |
| 03-07 | CALIBRATE SAMPLERS | 13APR95 | 25APR95 |
| 03-08 | INSTALL SAMPLERS #3, #4 & #5 | 26APR95 | 03MAY95 |
| 03-09 | CALIBRATE SAMPLERS | 04MAY95 | 09MAY95 |
| 03-10 | RECEIVE/INSTALL CANISTERS | 10MAY95 | 31MAY95 |
| 03-11 | INSTALL FIRST SAMPLING CYCLE | 01JUN95 | 12JUN95 |
| 03-12 | ROUTINE VOC SAMPLING STARTS | 13JUN95 | 13JUN95 |
| **FOUNDATION/INCIDENTAL WATERS** | | | |
| 04-01 | DEVELOP FW/IW PROJECT PLAN | 01FEB95* | 15MAR95 |
| 04-02 | LOCATE BUILDING SUMP LOCATIONS | 01FEB95 | 29MAR95 |
| 04-03 | DETERMINE/VERIFY DISCHARGE LOCATIONS | 16MAR95 | 17APR95 |
| 04-04 | ASSESS NEED TO CHARACTERIZE WATER | 18APR95 | 30MAY95 |
| 04-05 | INCORPORATE INTO EXISTING MONITORING PROGRAM | 31MAY95 | 31MAY95 |
| 04-06 | REVIEW/MODIFY FW/IW DOCUMENTATION PRACTICES | 01JUN95 | 30JUN95 |
| 04-07 | REVIEW EXISTING FW/IW MONITORING DATA | 16MAR95 | 28APR95 |
| 04-08 | ASSESS FW/IW DISCHARGE DIRECTLY TO SW | 16MAR95 | 28APR95 |
| 04-09 | INVESTIGATE/CHARACTERIZE NEW FW/IW | 01MAY95* | 03JUL95 |
| 04-10 | ASSESS DISPOSITION TO 3 TIER CRITERIA | 01MAY95 | 14JUL95 |
| 04-11 | INCORPORATE 3 TIER CRITERIA INTO MANAGEMENT | 17JUL95 | 16AUG95 |
| 04-12 | ASSESS HIGH PRIORITY FW/IW | 03JUL95 | 14JUL95 |
| 04-13 | CHARACTERIZE WATER QUALITY AND FLOW | 17JUL95 | 16OCT95 |
| 04-14 | ASSESS TREATMENT/TRANSPORTATION OPTIONS | 16OCT95 | 04JAN96 |
| 04-15 | DEVELOP MOA;ON SITE TREATMENT FOR ALL | 01DEC95* | 04JAN96 |
| **REAL TIME RADIOACTIVITY MONITORING (RTRM)** | | | |
| 05-01 | DEVELOP RTRM PROJECT PLAN | 31OCT94* | 16JAN95 |
| 05-02 | DESIGN/BUILD RTRM | 17JAN95 | 27FEB95 |
| 05-03 | CALIBRATE/LAB PILOT DEMO | 27FEB95 | 03AUG95 |
| 05-04 | FINAL RTRM DEMO/FINAL REPORT | 03AUG95 | 08SEP95 |




| | |
|---|---|
| Project Start | 01OCT94 |
| Project Finish | 03SEP96 |
| Data Date | 01OCT94 |
| Plot Date | 22JUN95 |

Progress Bar
Critical Activity



IMPL

Sheet 2 of 2

**FIGURE 2-8**
**PROPOSED-IMPLEMENTATION SCHEDULE**
**ROCKY FLATS ENVIRONMENTAL TECH. SITE**

| Date | Revision | Checked | Approved |
|---|---|---|---|
| | | | |



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### 2.6.2 Implementation Schedule Assumptions

If the following assumptions used to develop the proposed action schedules change, both short-term and long-term schedules may be affected and require revision by the IM/IRA Project Manager:

- DOE funding will be available to support manpower (internal and subcontractor), equipment, laboratory services, and existing sampling programs that are the foundation for the verification monitoring program.

- Manpower at EG&G will be at Fiscal Year 1995 first-quarter levels.

- Critical management and support personnel already familiar with the IM/IRA Project and associated IP work plans will be available.

- Programmatic changes to related programs will not affect the IM/IRA implementation activities. For example, changes in the Pretreatment Permit (sanitary sewer discharge) could affect disposition strategies for incidental waters and result in unforeseen schedule delays.

- Regulatory agencies will approve the implementation schedules and plan.

- Operations Management and site support will be available and consistent with the priorities of the IM/IRA/DD.

## 2.7 REFERENCES

EG&G Rocky Flats, Inc. 1994 (November). *Technical Memorandum No. 1, Investigations of Foundation Drains and Other Data Compilation Addendum to the Operable Units Work Plan.* Environmental Restoration Division. Golden, Colorado.

EG&G Rocky Flats, Inc. 1993 (September). *Control and Disposition of Incidental Waters.*

U.S. Department of Energy. 1994 (September). *Proposed Interim Measures/Interim Remedial Action Decision Document for the Rocky Flats Industrial Area.* Environmental Restoration Division. Golden, Colorado.

# 3.0 VERIFICATION MONITORING FOR TRANSITION ACTIVITIES

There are two major objectives behind the development of the verification monitoring program. The primary objective of the verification monitoring program is to provide an additional layer of environmental surveillance that will verify that contaminant pathway protection procedures and occupational monitoring are effective during transition activities. The type and extent of verification monitoring will depend on the type of transition activity being performed and the assessed environmental hazard associated with that activity. A secondary objective of the verification monitoring program is to use existing environmental monitoring programs, to the extent possible, to achieve the first objective. The IM/IRA/DD (DOE 1994) reviews and evaluates the existing monitoring programs and specifies proposed actions for the existing programs to meet the objectives of the verification monitoring program.

The following sections describe (1) the components of the verification monitoring program, (2) COPC screening methodology for transition activity sites, (3) collection and compilation of the baseline data sets, (4) calculation of action levels for COPCs selected at a transition activity site, (5) installation of verification monitoring equipment, and (6) preprogrammed responses to potential release conditions. Also included in this section are the verification monitoring schedule, transition activity schedule, and responsibility matrix for implementing the preprogrammed responses during verification monitoring.

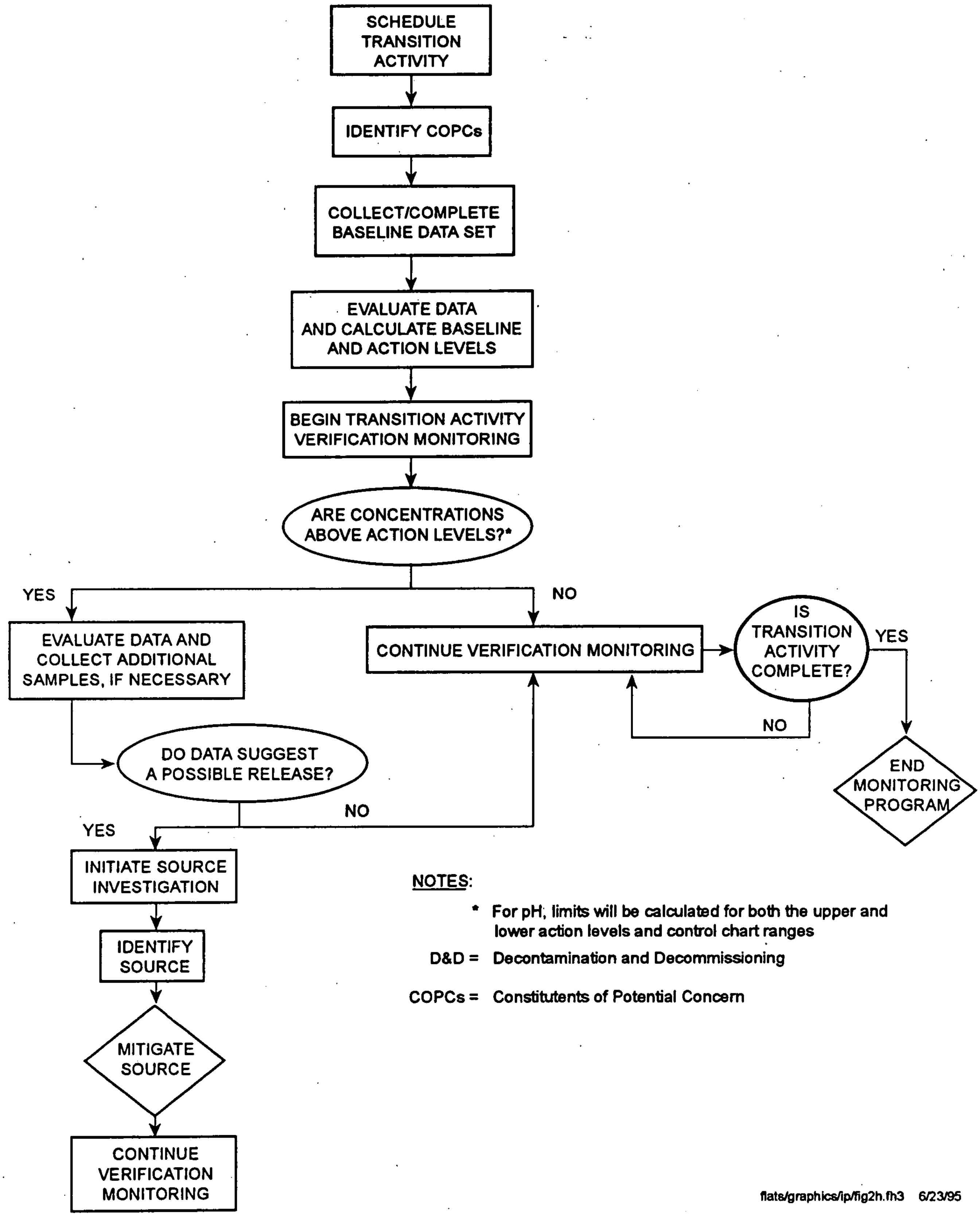
## 3.1 DESCRIPTION OF THE VERIFICATION MONITORING PROGRAM

The verification monitoring program will include environmental monitoring of the air, surface-water, and groundwater pathways. After a transition activity is scheduled, the type of activity will be assessed, pathway protection measures at the site will be determined, and the COPCs will be identified that may be associated with the building and the subbasin in which the activity will be located. The method for selecting COPCs that will be included in the verification monitoring of the media that may be affected by the transition activity is described in Section 3.2. Currently, Building 889 has been scheduled for D&D. The COPC screening method described in Section 3.2 includes a discussion of the COPC screening for Building 889, as an example of the applicability of the methodology. Figure 3-1 is a logic diagram showing the components of the verification monitoring program.

After the COPCs have been selected for each medium at a transition activity site, a baseline data set will be compiled or collected. If there are existing sample results for an environmental medium, the results will be compiled from a sufficient number of samples and time period to calculate the mean baseline and action levels. The baseline methodology and action-level calculations are described in Section 3.3. If a data set does not exist for a medium or there are not sufficient data, samples will be collected from verification monitoring sample points before the transition activity begins to establish the necessary baseline data set. The baseline methodology will then be applied to the newly acquired data set, as discussed in Section 3.3. The action-level concentrations for each medium of concern will be input into the DSS. The DSS is described in Section 4.0.

When the transition activity begins, the verification monitoring of the activity will begin. Air, surface-water, and groundwater samples will be collected from the site-specific monitoring points as described in Section 3.4. Data from verification monitoring will be input into RFEDS and accessed via the DSS. IM/IRA personnel will extract the results periodically (depending on the media) from the DSS and evaluate them to determine if any results are above action levels. Verification monitoring and data evaluation of the results will continue throughout the activity. Depending on the media, verification monitoring may continue after the activity long enough to detect any potential release that may occur on the last day of the activity.

**FIGURE 3-1**
**VERIFICATION MONITORING PROGRAM**
**INDUSTRIAL AREA IM/IRA/IP**
**ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE**




NOTES:

* For pH, limits will be calculated for both the upper and lower action levels and control chart ranges

D&D = Decontamination and Decommissioning

COPCs = Constitutents of Potential Concern

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If the periodic data evaluation indicates that the transition activity may have caused or is causing a release, the data may undergo a more intensive review and additional samples may be collected to support or refute the preliminary conclusions. If the data suggest that a release potential exists, an investigation will be initiated to evaluate the transition activity for possible sources of contamination. Once the source is identified, the activity will be modified to prevent further release and the impact of the release will be evaluated and mitigated.

Verification monitoring programs for air, surface water, and groundwater are described in more detail in Section 3.4. Media-specific preprogrammed responses (actions) for evaluating the potential for and responding to transition activity releases are described in Section 4.0.

## 3.2 IDENTIFICATION OF CONSTITUENTS OF POTENTIAL CONCERN

The primary objective of the COPC identification process is to determine and select a suite of chemicals, on a building or process-stream basis, that are representative of the chemicals contained within a facility and that may be used as surrogates for all COPCs. In essence, this means selecting a list of key indicator chemicals for verification monitoring during a transition activity, such as a demolition phase (for a D&D activity), rather than monitoring every chemical known to exist in a building. These chemicals act as action triggers and if at any point in a transition activity one or more of them exceeds a predetermined action level, a predetermined action will be initiated. That action can range from an investigation of the chemical source within the facility to a potential temporary shutdown of the transition activity until the source of contamination is determined.

### 3.2.1 General Approach to Chemical Selection

The primary COPCs for the transition activity programs are largely residual chemicals and by-products that were used in a building, generally in a process stream. Most of the chemicals are associated with processing equipment (tanks, valves, pipes, gloveboxes, etc.), but there are also contaminants in and around the building structure due to releases from leaks, spills, accidents, maintenance activities, and other sources. These chemicals are expected to exist throughout and under the facility.

Building 889 was selected as the trial facility for the verification monitoring chemical selection. Building 889 is currently inactive and moving into D&D.

Waste materials entering Building 889 included surplus equipment, high-efficiency particulate air (HEPA) filters, and combustible materials (e.g., paper and plastic) generated inside process areas where personnel protective equipment was required for entry and decontamination was required prior to exit (EG&G 1990). All waste materials entering Building 889 originated in buildings outside the Protected Area. Surplus equipment was evaluated for possible future use, and if usable, was decontaminated with a steam cleaner, potable water, and soap (e.g., Peck's Spray 66). Decontaminated equipment was reused onsite or sold offsite. Equipment that could not be decontaminated was reduced in size to fit into a waste crate (4 by 4 by 7 feet). Metal parts and HEPA filters were crushed in the drum crusher before being placed in waste crates. Combustible wastes were compacted into bales before being placed in waste crates. Waste crates were filled to capacity and sent to Building 664 for storage.

Any combination of waste types were placed in a single crate. Equipment that had been steam cleaned either for reuse or offsite sale (recycled or decontaminated metal equipment) was sent to Property Utilization and Development. Catchment basins in the steam cleaning area conveyed the wash water, by gravity flow, into two 400-gallon sumps beneath the building. Process wastewater from the sumps was pumped to Building 886 for collection and subsequently to Building 374 for treatment. The chemicals known to have been used in Building 889 are discussed in the following section.

### 3.2.2 Procedure for Selection of Constituents of Potential Concern

A five-step approach has been developed to select the list of chemicals for a verification monitoring program. The general program is described below.

Initially, the following list was compiled from existing data sources of chemicals known to have been used or released, or that are present at RFETS and/or within any given OU, building, or process-stream:

- Waste Stream and Residue Identification and Characterization (WSRIC) database;
- Waste and Environmental Management System (WEMS) database;
- *FY93 Systems Engineering Analysis (SEA) Facility Characterization and Inventory Appendices* (EG&G 1993a);
- *Final Plan for Prevention of Contaminant Dispersion* (DOE 1991);
- *Dose Reconstruction Project: Briefing Book No. 5* (Colorado Department of Health [now CDPHE] 1991); and
- various other reports, notes, and correspondence.

Because of the large number of chemicals reported, many of which are difficult to determine analytically or are lacking sufficient toxicological data, the list that was decided upon was the EPA's target compound list as specified in the *Rocky Flats Plant Site Wide Quality Assurance Project Plan for CERCLA Remedial Investigations/Feasibility Studies and RCRA Facility Investigation/Corrective Measures Studies Activities* (EG&G 1991). That list was used to assist in determining the nature and type of chemicals known to exist on a sitewide basis and to have been used within each OU and to help in selecting the chemicals to be monitored during the IM/IRA verification monitoring program. The list is included in Appendix D1.

The five-step COPC selection process has been developed and is summarized below:

<u>Step 1</u>. The first step is to assemble all known chemical data to create a list of chemicals known to have been used or be present in a given OU, building, or process-stream at or near the transition activity site.

For example, to determine the chemicals used or present in Building 889 the following data sources were used:

- WSRIC database;
- WEMS database;
- Under Building Contamination program data;
- Building 889 site characterization reports (EG&G 1990); and

- *FY93 Systems Engineering Analysis (SEA) Facility Characterization and Inventory Appendices* (EG&G 1993a).

Based upon the information contained in the FY 93 Systems Engineering Analysis (EG&G 1993a) and in EG&G (1990) reports, a list of chemicals known to have been used or present in Building 889 was constructed (Appendix D2). Because Building 889 was not a major production area or process-stream-oriented area, the chemicals selected are basically those reported on a waste-stream characterization basis. Other buildings, where a process-oriented function occurred, will require a more detailed analysis of chemicals known to exist within the building to develop a similar list.

Step 2. The second step of the process involves a chemical toxicity screening. The list of chemicals in Appendix D1 are compared to the EPA's Integrated Risk Information System (IRIS) database or to the EPA's Health Effects Assessment Summary Tables (EPA 1994a) (or one of the commercially available versions) to determine if the chemicals on the list have a chemical slope factor (SF) for carcinogenic or reference dose (RfD) for noncarcinogenic effects. For this monitoring effort, only those chemicals having a SF or RfD are retained (Appendix D3). Chemicals without toxicological information are not included in the specific COPC list.

It is emphasized that although transition verification monitoring is not a risk- or health-driven evaluation, the toxicity information is necessary for activity-specific COPC selection. Even if toxicity values are not available for some chemicals, the chemicals may be considered important enough to retain for monitoring. In such cases, it may be assumed that the toxicities of these compounds are equivalent to the most toxic chemical within the chemical class of which the COPCs are members. For example, some chemicals are poorly identified (e.g., "unidentified glycol ethers") or may have no health-based criteria (e.g., 1-(2-methoxy-1-methylethoxy)-2-1-methylethoxy)-2-propanol). In these situations, it may be conservatively considered that their



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toxicity is equivalent to the most toxic glycol ether, 2-methoxyethanol acetate. Instances will arise where this procedure is inadequate or presents a special problem. When this happens, it is recommended that those chemicals be handled by contacting the Environmental Restoration Department (current contacts are Win Chromec at ext. 8641 or Richard Roberts at ext. 8508). That department will make appropriate contacts for guidance or advice. If the chemical is considered significant from a toxicological standpoint and no toxicity data are available, under specified provisions of the IAG a site-specific RfD may be calculated (Chromec 1995).

For Building 889 the toxicity screen was performed using a commercially available version of EPA's IRIS database, *The Electronic Handbook of Risk Assessment Values* (EHRAV) (Electronic Handbook Publishers 1994). Chemicals presented in Appendix D2 were compared to the EHRAV and those found having a SF or RfD were retained for further screening. Appendix D3 presents the chemical list that passed this screening criterion.

Step 3. The third step is to make a physicochemical comparison, using as criteria those attributes that influence chemical mobility and persistence.

A chemical is retained in the COPC list if it is highly persistent or mobile. Physicochemical parameters that describe those processes include environmental half-life, water solubility, and log $K_{ow}$ and $K_{oc}$ for organic chemicals. The log octanol-water partition coefficient (log $K_{ow}$) is the logarithm of the ratio of the chemical concentration in octanol to the concentration in water. A high log $K_{ow}$, typically greater than 3, indicates higher concentrations in the octanol than in the water. $K_{oc}$ is an equilibrium constant that measures the partitioning between organic carbon and water. $K_{oc}$ is useful for describing the mobility potential of a chemical because it correlates well with adsorption to soil and sediment. A chemical's mobility is generally proportional to its water solubility and inversely proportional to $K_{ow}$ and $K_{oc}$. Chemicals with log $K_{ow}$ less than 2.7 and $K_{oc}$ less than 50 are considered highly mobile (EPA 1994b). A $K_{oc}$ greater than 500 generally indicates a low mobility potential. Persistence is measured by the number of days required to reduce the chemical concentration by one-half. Chemicals are considered highly persistent if their half-lives in water are greater than 90 days (EPA 1994b).

For purposes of this screening evaluation volatile chemicals will be considered. A volatile substance may be defined as any chemical having a vapor pressure greater than 1 x $10^{-3}$ mm Hg (Mercury) or a Henry's Law constant greater than 1 x $10^{-5}$ atm-$m^3$/mol. If a detected chemical(s) meets these criteria, it is retained for further evaluation in the selection process.

An additional factor that is more difficult to quantitate is that of media specificity. Some compounds will more readily be found in one type of environmental medium than another. For example, polychlorinated biphenyls (PCBs) are generally not found in air samples, but are commonly found in soil/sediment or groundwater samples. In screening chemicals based on physicochemical properties, professional judgment must be used to determine the likelihood of any given chemical being found in a given medium type.

For a building or process-stream where a large number of chemicals are present and where a chemical is similar to others in its class, this procedure will reduce the list by a significant number.

For Building 889 this screen was performed for each chemical found in Appendix D3. The chemicals evaluated passed the screening criteria and all were retained.

Step 4. The fourth step in the process is to evaluate the chemicals in terms of available analytical methodologies. For the transition activity monitoring program, a chemical with a long and difficult extraction process, a difficult analytical procedure, no readily available analytical method, or no adequate analytical detection level will be of limited usefulness as a monitoring tool.

Currently, two documents are available to assist in evaluating the availability of analytical methodology:

- *General Radiochemistry and Routine Analytical Services Protocol (GRRASP). Part A. General Analytical Services Protocol (GASP) - Organics, Metals, Water Quality Parameters, and Biota* (EG&G 1993b).

- *General Radiochemistry and Routine Analytical Services Protocol (GRRASP). Part B. Radioanalytical Services Protocol (RASP)* (EG&G 1994).

The chemicals in Appendix D3 were subjected to this screening and all compounds were found to have adequate analytical methodologies and detection limits (for the low levels expected from many chemicals).

Step 5. The final step in the process of chemical selection is a compilation of the compounds that remain after the screening steps. That list will serve as the final COPC list for verification monitoring of any given building or process-stream.

For Building 889 the final list of monitoring chemicals passing the screening criteria are presented in Appendix D3.

Although every attempt will be made to select reasonable and proper chemicals for the verification monitoring program, not every eventuality can be anticipated. During the course of the verification monitoring program, it will be necessary and proper to use best professional judgment. The IM/IRA Project Manager will reserve such subjective evaluations for those situations that cannot be addressed by other means. The five-step approach for COPC selection is shown in Figure 3-2.

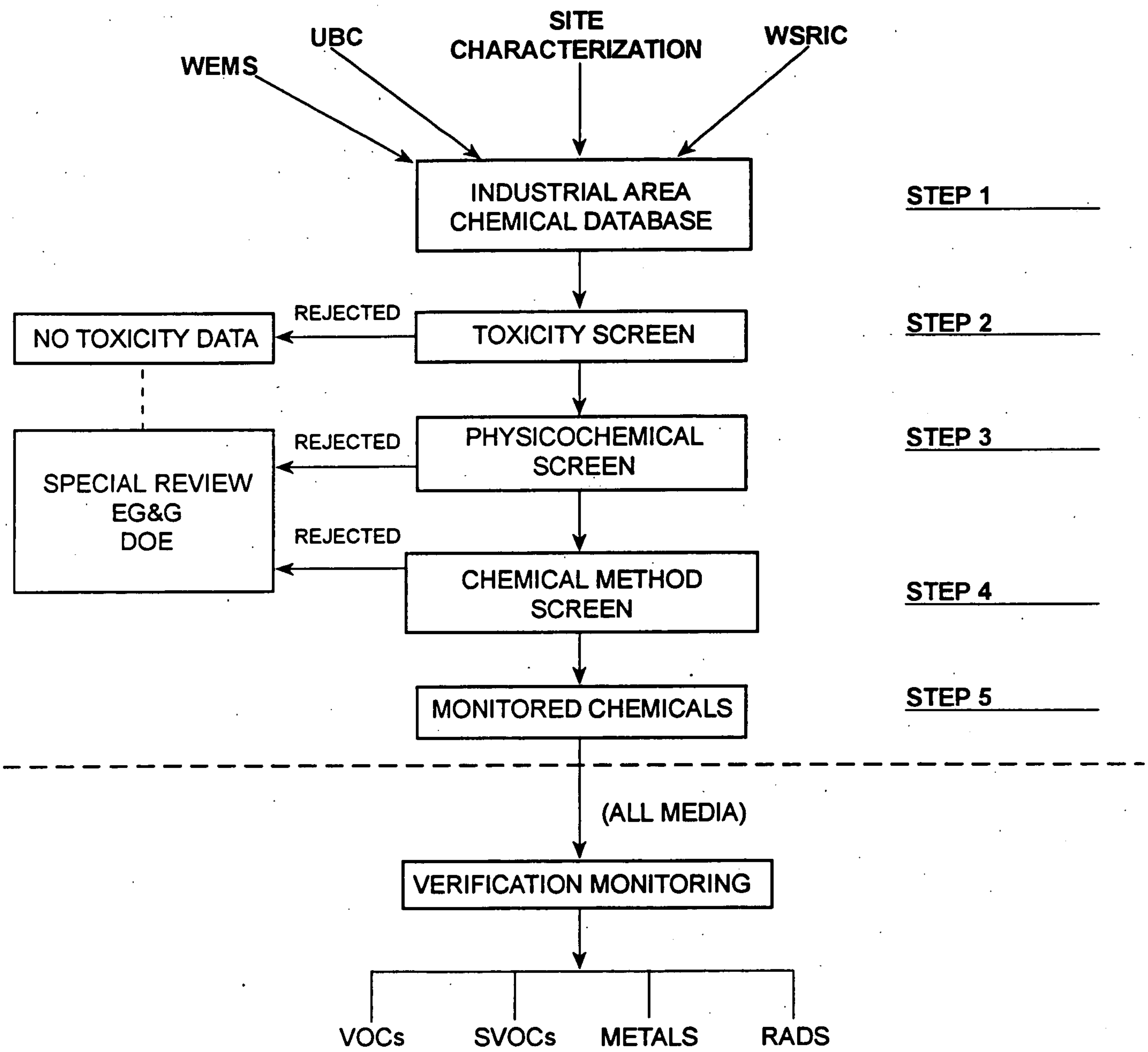
### 3.2.3 Computerization Process for Selecting Constituents of Potential Concern

A large amount of chemical and waste information exists for buildings in the Industrial Area. Most of the chemical and waste data resides in existing and independent databases. The COPC selection procedure can be performed manually; however, it may be possible to computerize most of the selection process. Various chemical and waste databases would need to be merged into a single database. This single database would be screened in accordance with the same COPC selection protocol described in Section 3.2.2, by using commercially available databases. The computerized approach would still allow for professional judgment to review the chemicals rejected from the screening process. Figure 3-3 provides a flowchart of the computerized COPC selection process. The following is a brief discussion of the computerized process:

<u>Chemical Database</u>. The chemical database would contain chemical and waste information acquired from existing databases such as WEMS and WISRIC. In addition, this database would contain RFEDS data from pertinent OU investigations and historical information from under-building contamination studies.

<u>Initial Screening</u>. The initial screening procedure would remove all duplicate chemical names from the database and would reject trade names based on the lack of a Chemical Abstracts Service (CAS) number. A qualified chemist would verify the data for duplicate chemicals with

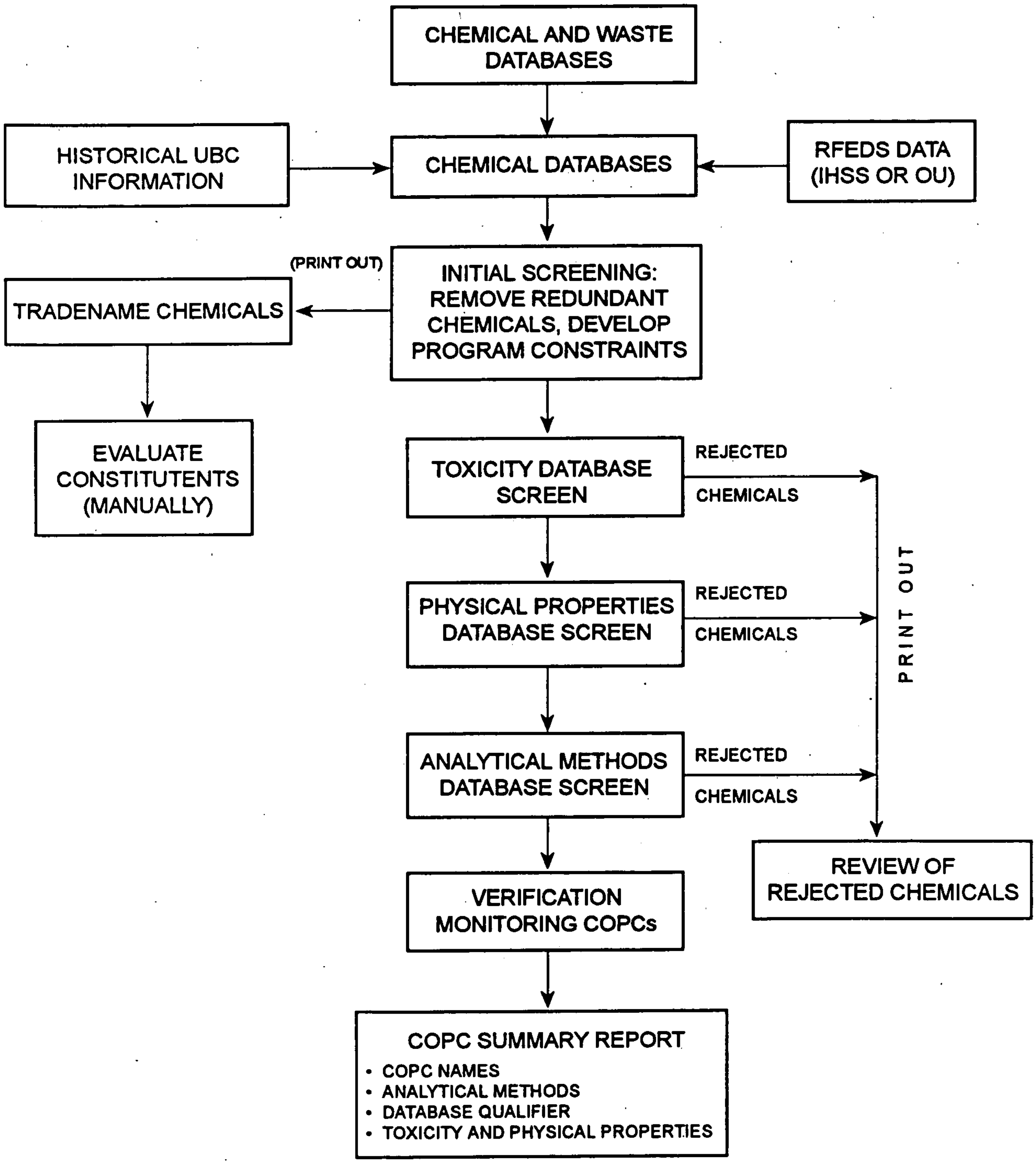
**FIGURE 3-2**
**COPC SELECTION PROCESS**
**INDUSTRIAL AREA IM/IRA/IP**
**ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE**




Notes:

COPC = Constituents of Potential Concern
DOE = U.S. Department of Energy
EG&G = EG&G Rocky Flats, Inc.
SVOC = Semivolatile organic compounds
UBC = Under Building Contamination
VOC = Volatile organic compounds
WEMS = Waste and Environmental Management System
WSRIC = Waste Stream Residue Identification and Characterization

# FIGURE 3-3
# COMPUTERIZED COPC SELECTION PROCESS
# INDUSTRIAL AREA IM/IRA/IP
# ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE




Notes:
COPC = Constituents of Potential Concern
IHSS = Individual Hazardous Substance Site
OU = Operable Unit
RFEDS = Rocky Flats Environmental Data System
UBC = Under Building Contamination

different nomenclatures (e.g., 1,2-dichloroethylene and 1,2-dichloroethene). The rejected trade names would be reviewed and, if necessary, investigated to determine the chemical constituents by reviewing material safety data sheets. In addition, certain computer program constraints could be placed on the initial screening process, such as volumes of chemicals, frequency of chemical detections, and concentrations greater that a given value.

Toxicity Database Screen. The remaining database would be screened using a chemical toxicity database. Using a chemical toxicity database such as EHRAV would allow determination of whether there is a slope factor or an RfD factor for the possible COPCs. Chemicals without slope factors or RfDs would be rejected and reviewed using professional judgment.

Physical Properties Database Screen. The remaining list of possible COPCs would be screened by a database that contains critical chemical properties. These properties are Henry's Law constant, octanol-water partition coefficient, organic-carbon partition coefficient, and persistence. Examples of databases that contain this type of physical property information would be EHRAV (without persistence information) or the *Thermochemical and Physical Properties Database* (EPA 1990).

Analytical Methods Database Screen. The final screening of the possible COPCs would use an analytical methods database. This screening approach would determine if there were EPA- or American Society for Testing and Materials-approved methodologies for the possible COPCs remaining in the database. DOE approved methods would require modification of the analytical methods database. An example of this type of database is *Electronic EPA Methods by ChemSoft* or a commercially available database such as The Bureau of National Affairs' *Environmental Library on CD*. The end result from this analytical method screening would be the final COPC list for verification monitoring.

COPC Summary Report. A COPC summary report can be developed by the computer program. This summary report can list the following information: (1) COPC names, (2) associated CAS numbers, (3) toxicity and physical property constants, (4) database qualifiers to determine the origin of the chemical entering the database (e.g., WEMS, OUs, WSRIC), and (5) available analytical methods and associated method detection limits.

## 3.3 ESTABLISHMENT OF BASELINES AND ACTION LEVELS

In order to determine the effects of transition activities on the various environmental media, it will be necessary to establish baseline concentrations from which to measure deviations. As described previously, the media to be monitored will be air, surface water, and groundwater. Baseline concentrations are defined as those measured in samples collected before transition activities are initiated from locations that might be affected by releases from transition activities.

The selection of the baseline data, the statistical manipulations used to generate the action-level concentrations, and the appropriate response in the event action levels are exceeded are discussed in the following sections.

### 3.3.1 Definition and Purpose of Baseline and Action Levels

Action levels are statistically determined concentrations against which monitoring data will be compared. Action levels are generally defined as statistically developed, predetermined concentrations that are two standard deviations greater than the mean. Because the acts of sampling and analysis of an environmental medium can introduce error into the measured concentration, it is necessary to manipulate the measured concentrations in order to generate an estimate of the true concentration of each constituent. The baseline mean concentration will be the arithmetic statistical mean of the baseline data set for each COPC (Section 3.2) whose population is normally or lognormally distributed. Action levels will be established at two standard deviations greater than the mean. The action levels will be used to indicate a change in concentration that is potentially due to transition activities. If the action levels are exceeded, the data will be further evaluated to assess a potential transition activity release. Exceedances of action levels will generally be determined by employing control-chart methodology. It is important to continue monitoring, in order to verify that observed changes in concentration are due to transition activities and are not reflecting a natural, overall change in the environment.

### 3.3.2 Data Acquisition to Establish Limits

There will be two sources of data for the baseline statistical analyses. The first source will be historical data maintained in the RFEDS. The second source will be sampling from existing or new monitoring locations that are established for a given location before transition activities begin.

#### 3.3.2.1 Historical Data

Over the period of operations at Rocky Flats, air, surface water, groundwater, and other media have been monitored for selected chemical constituents and physical properties. Groundwater samples are collected quarterly from 155 wells in the Industrial Area. In addition, surface-water samples are collected quarterly from about 20 different locations along major drainages in the area. The IM/IRA/DD specifies that 25 historical groundwater monitoring locations and six Industrial Area surface-water outfalls will be sampled as part of routine IM/IRA monitoring.

The surface-water and groundwater samples are measured for field parameters (temperature, pH, and conductivity) at the time they are collected. The samples are preserved, cooled, and shipped



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to the laboratory for analysis. The RFETS standard analytical suites for groundwater samples are the following:

- Target Compound List VOCs;
- water quality parameters—indicators and selected anions;
- gross alpha, gross beta, uranium, cesium, radium, and strontium (dissolved);
- Contract Laboratory Program Target Analyte List (TAL) standard and additional metals;
- tritium, plutonium, and americium (total); and
- cyanide.

Verification monitoring will not affect the current quarterly groundwater sampling program.

Surface-water samples collected for the verification monitoring program will be analyzed for COPCs associated with the facility undergoing transition activities and the subbasin in which the building is located.

Air monitoring is currently conducted for radiological stack emissions, gaseous radiological effluent emissions (tritium), radioactive particulates in ambient air, and nonradioactive particulates in ambient air. Effluent emissions are monitored for plutonium, americium, uranium, tritium, gross alpha, beryllium, nitrous oxides, TSP, and particulate matter less than 10 micrometers in diameter (PM-10). Ambient air is monitored for radionuclides and nonradiological particulates including TSP and PM-10.

RFEDS includes analytical results for many of these constituents for many years. For locations that have sufficient historical data and are sufficiently close to the proposed transition activities, the historical data will be used to establish baseline and action levels. At a minimum, 12 measurements will be used for the statistical manipulation.

### 3.3.2.2 Newly Installed Sampling Points

Because not all of the locations to undergo transition activities have historical sampling points in locations appropriate for verification monitoring, it will be necessary to install additional sampling points. The IM/IRA/DD specified the installation of 11 additional groundwater monitoring wells. The groundwater monitoring wells are being installed during the 1995 WARP. In addition, a set of well points will be installed in the immediate vicinity of a specific transition activity site.

Upon completion of monitoring well and well-point installation and development, pumping tests or slug tests will be conducted to determine the hydraulic conductivity of the aquifer. This measurement will be used along with the distribution of hydraulic head to calculate a transmissivity for the aquifer. The transmissivity allows determination of the time interval that must be allowed between successive independent groundwater samples. A minimum of 12 independent samples, if possible, will be collected from each new monitoring well and well point for the establishment of baseline concentrations and action levels. If the timing of transition activities does not allow for the collection of 12 samples, all of the data that have been collected before transition activities will be used to establish baseline conditions. Depending on relative locations of different transition activities, data collected for baseline relative to one transition activity may also be appropriate for verification monitoring of a different transition activity.

Surface-water sampling points will be located at outfalls of the major basins in the Industrial Area and subbasins located in proximity to the area to undergo transition activities. Generally, the surface-water sampling points will be located downgradient of the potential transition activity site and near the outfalls of subbasins that could potentially be affected by transition activities. New surface-water sampling points will be installed 18 months before the start of transition activities, if possible. Because most of the surface-water drainages are dry much of the year, surface-water samples will be collected via automatic samplers during precipitation events. Each precipitation event is considered independent and the analytical data are similarly independent. The number of samples used in the statistical calculations will depend on the number of storms that initiate surface-water sampling.

DOE has instituted a plan for the upgrade and installation of new Radioactive Ambient Air Monitors over the next two years (EG&G 1993c). Summa™ canisters for the collection of air samples for VOC analysis will also be installed at four of the established sites. Because airflow is more rapid and responds to very small atmospheric pressure gradients, it will be possible to collect independent background samples in a relatively short time. Thus, analytical data from a minimum of 12 air samples will be used to calculate the baseline concentrations and action levels.

### 3.3.3 Statistical Calculations

The statistical calculations used to determine baseline concentrations and action levels are dependent on the population distribution for each constituent and the size of the sample population. The sample population for a given COPC at a given location for an environmental medium consists of all possible COPC values that could be measured in samples from that location (e.g., all possible measurements of a given COPC at a given well). A statistical sample consists of a given collection of actual physical samples from the location. The population distribution describes the relative frequencies of given values within the population. The statistical calculations discussed below are based on those recommended in *Statistical Analysis of Ground-Water Monitoring Data At RCRA* (Resource Conservation and Recovery Act) *Facilities - Interim Final Guidance* (EPA 1989) and the *Statistical Analysis of Ground-Water Monitoring Data At RCRA Facilities - Addendum to Interim Final Guidance* (EPA 1992).

These guidance documents recognize three population distributions and provide methods for calculation of the various statistical limits with specified confidence. The three population distributions are Gaussian (normal), lognormal (natural log transformation), and "other." The "other" distribution considers all data that do not fit a normal or lognormal distribution, but assumes that baseline and verification monitoring data come from the same population, whatever the distribution of that population is. These data are treated using nonparametric statistical methods.

Before performing statistical manipulations with the baseline data, the data will be investigated for evidence of seasonality or other periodicity or trends. The DSS (Section 4.0) will contain tools for testing data distributions for such effects. Filtering and data transformation functions may be used for correcting the data for these effects.

### 3.3.3.1 Normal Population Distribution

The first step in selecting appropriate statistical methods is to determine the population distribution of the raw baseline data. The addendum to the RCRA statistical guidance recommends that probability plots be used as a measure of the normality of the data. There are two additional manipulations recommended for testing the normality of a data set, the coefficient of skewness and the Shapiro-Wilk test. The Skewness Coefficient ($\gamma$) is calculated via the following formula (EPA 1992):

$$\gamma = \frac{\frac{1}{n}\sum_i (x_i - \bar{x})^3}{\left(\frac{n-1}{n}\right)^{3/2} (SD)^3}$$

where n is the number of samples, SD is the standard deviation, $x_i$ is the individual measurement of concentration, and $\bar{x}$ is the mean of the data set. Data drawn from a normal distribution will have a skewness coefficient of zero. As noted by EPA (1992), a small degree of skewness is not likely to affect the results of statistical tests based on the assumption of normality. However, if the absolute value of the skewness coefficient is greater than 1, and the statistical sample size (i.e., number of physical samples) is fewer than 25, then alternatives to tests based on normality (e.g., log-transformation of the data, or application of nonparametric tests) should be applied. Under these conditions, standard tests based on normal theory are much less powerful than when the skewness is less than 1 (EPA 1992).

The Shapiro-Wilk test statistic (W) is calculated using the following formula (EPA 1992):

$$W=\left[\frac{b}{SD\sqrt{n-1}}\right]^2$$

where

$$b=\sum_{i=1}^{k} a_{n-i+1}\left(x_{(n-i-1)}-x_{(i)}\right)=\sum_{i=1}^{k} b_i \ ,$$

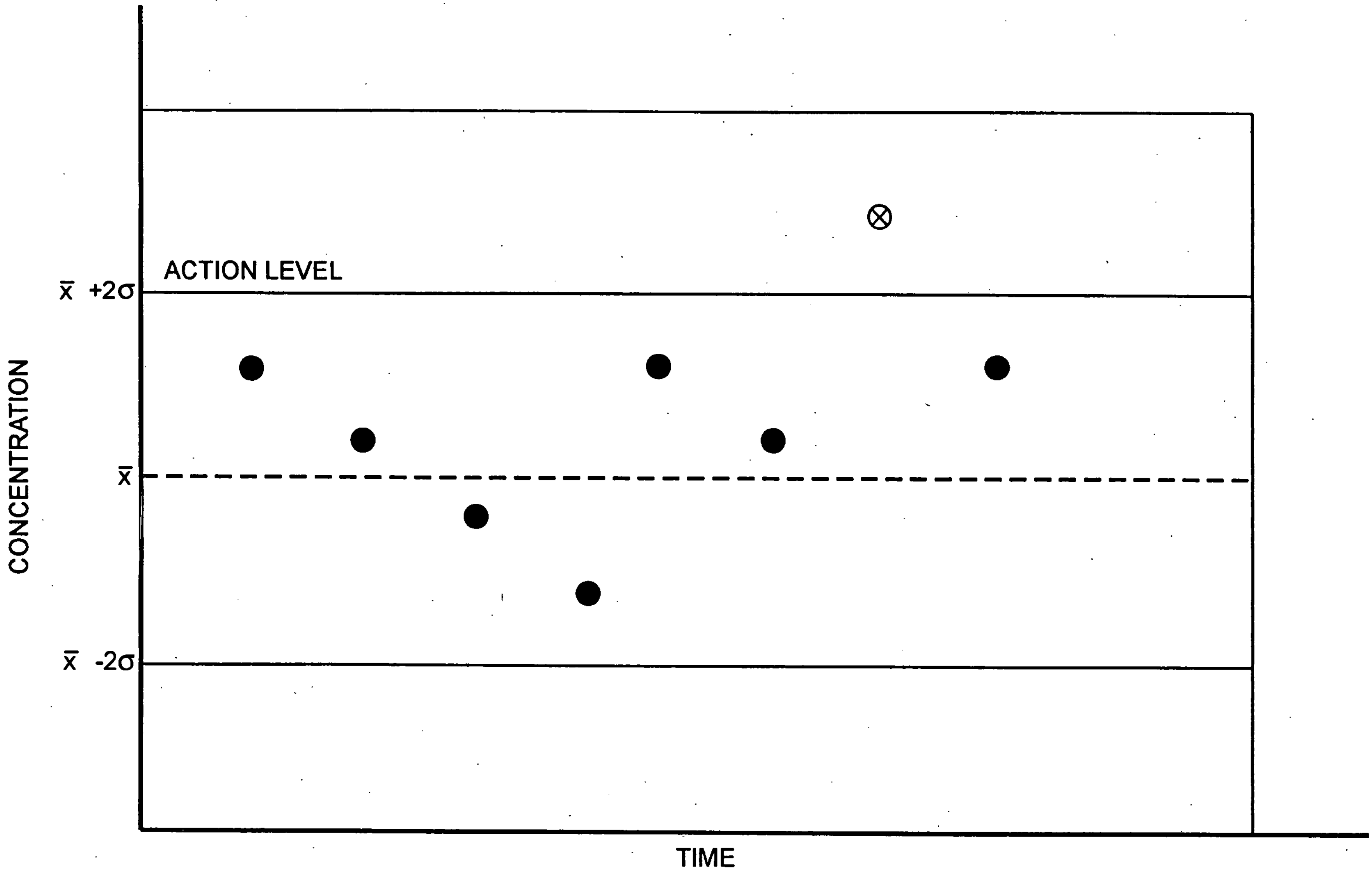
the $x_{(i)}$ are the data ordered from smallest to largest, and $a_i$ is a coefficient taken from Table A-1 in Appendix A of the Interim Final Guidance (EPA 1989). The W statistic is large when the probability plot is nearly linear. If the W statistic is less than the tabulated critical value (EPA 1992), then the assumption that the data are normally distributed should be rejected.

If the data have been determined to be normally distributed, the mean ($\bar{x}$) and standard deviation (SD) will be calculated and used to generate control charts. The action level will be set at the mean plus two standard deviations. The mean plus two standard deviations is approximately equal to the 97.5 percentile value of a normal distribution, i.e., the value below which 97.5 percent of the distribution is expected to fall. For pH, the action level will be set at the mean plus or minus two standard deviations. The mean plus or minus two standard deviations are approximately equal to the 97.5 and 2.5 percentile values, respectively, of a normal distribution. That is, values within the range of the mean plus or minus two standard deviations are expected to encompass the central 95 percent of the distribution. The control charts will be used as an indication of potential releases of hazardous constituents from an active transition activity. An example of a control chart is shown in Figure 3-4. The example shows the baseline mean and action levels, data that are "in control" in the sense that they do not exceed action levels, and data that exceed the action level and thus require further investigation, as outlined below.

An exceedance of the control chart action level, as defined in the preceding paragraph, can give an indication during verification monitoring of a short-term release of COPCs. However, application of the standard control chart methodology may not be sufficient to indicate a gradual increase in COPC concentrations, which could also be due to COPC release during the verification monitoring period. Thus, the standard control-chart methodology (also known as the Shewhart control-chart methodology) will be supplemented by the Cumulative Sum (or CUSUM) control-chart methodology (Gilbert 1987; Gibbons 1994; EPA 1989, 1992).

The combined Shewhart-CUSUM control chart is prepared by first normalizing the verification monitoring data from a given monitoring station by using the mean $\bar{x}$ and standard deviation SD determined from the baseline data at that monitoring station. The normalized value of the concentration $x_i$ at time $t_i$ is given by

**FIGURE 3-4**
**EXAMPLE CONTROL CHART**
**INDUSTRIAL AREA IM/IRA/IP**
**ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE**




$\bar{x}$ = BASELINE MEAN

σ = STANDARD DEVIATION

● = "IN CONTROL" DATA

⊗ = DATUM IN EXCESS OF ACTION LEVEL - NOT "IN CONTROL"

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$$Z_i = (x_i - \bar{x})/SD.$$

In addition to the normalized value $Z_i$, compute also the cumulative sum $S_i$ as

$$S_i = \max\{0, Z_i - k + S_{i-1}\},$$

where $S_0 = 0$, and k is one-half the value, in units of standard deviation, of the displacement that should be quickly detected. For $k = 1$, a displacement of two standard deviations will be quickly detected (EPA 1989). $Z_i$ and $S_i$ are then plotted versus time $t_i$, and compared with Shewhart and CUSUM action levels. EPA (1989) recommends, for groundwater data, that the Shewhart action level be set at four and one-half standard deviations, and the CUSUM action level be set at four or five standard deviations when $k = 1$. For consistency with the standard control chart approach defined above, the Shewhart action level will be set at two standard deviations, and the CUSUM action level will be set at four standard deviations.

In the event that a measurement of the concentration of any COPC falls outside of the action levels, an investigation as to the cause of the increase (or possible decrease, for pH) in concentration will be initiated. As part of this investigation, the location can be resampled and all of the data evaluated in accordance with normal prediction intervals (Gibbons 1994). Prediction intervals are concentration intervals, based on a set of *n* baseline data, that will, with specified confidence, contain the next *m* data drawn from the population. Prediction intervals can be developed for parametric or nonparametric distributions using one of several formulas presented by Gibbons (1994). If one or more of the next *m* data fall outside the prediction interval, it can be concluded that the datum represents a value that is not drawn from the baseline data set.

It is important to note that because the establishment of concentrations in excess of action levels must be accomplished in a timely manner, statistical analyses will be conducted on nonvalidated data. It is unusual for measured concentrations of hazardous constituents to change during the data validation process. The most common changes are for the data to be qualified as estimated, in which case they are usable, or to be rejected, in which case they are not usable. Use of the nonvalidated data during verification monitoring would thus be conservative, in most instances. However, in some cases data validation may result in changes in actual reported values (e.g., validators may determine that the dilution factor or calibration was incorrect). If data validation results in the rejection of or changes in reported data, the associated statistical analyses will be updated and/or repeated, as appropriate.

The combined Shewhart-CUSUM control chart methodology will detect either short-term deviations of COPC concentrations from baseline conditions, or more gradual trends of deviation from baseline conditions. A third possibility can occur, in which there is a shift in the COPC mean to a new level that may be less than two standard deviations different from the baseline mean. Such a shift would not produce exceedances of the Shewhart control-chart action level, and might not produce exceedances of the CUSUM control-chart action level. However, the graphical presentation of the control chart would provide visual evidence of the shift in mean. To verify whether such an apparent shift in mean is truly significant, the standard t-test will be applied to test the hypothesis that the baseline mean and the verification monitoring mean are equal. Let $n_i$, $\bar{x}_i$, and $s_i$ represent the sample size, sample mean, and sample standard deviation, respectively, with $i = 1$ representing baseline values and $i = 2$ representing verification-monitoring values. If the variances of the baseline and verification-monitoring distributions are equal, then the t-statistic is given by

$$t = (\bar{x}_1 - \bar{x}_2)/[s_p(1/n_1 + 1/n_2)^{1/2}],$$

where

$$s_p^2 = [(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2]/(n_1 + n_2 - 2).$$

The statistic t is then compared with tabulated values of the Student t-statistic for a given confidence level and $n_1 + n_2 - 2$ degrees of freedom to complete the test (Guenther 1965). A similar approach will be used if the variances of the baseline and verification-monitoring distributions cannot be reasonably assumed to be equal. In this case, the sample t-statistic is given by

$$t = (\bar{x}_1 - \bar{x}_2)/(s_1^2/n_1 + s_2^2/n_2)^{1/2},$$

which is approximately distributed as the Student t-statistic (Guenther 1965) with degrees of freedom

$$d = (s_1^2/n_1 + s_2^2/n_2)^2/[(s_1^2/n_1)^2/(n_1 - 1) + (s_2^2/n_2)^2/(n_2 - 1)] - 2.$$

### 3.3.3.2 Lognormally Distributed Data

Many environmental data sets have been shown to be normally distributed after the concentration data have been transformed to their Naperian logarithms. The transformed data are tested using the same statistical analyses covered in the previous section. Probability plots, skewness coefficients, and Shapiro-Wilk statistics will be calculated. In the event that the data prove to be lognormally distributed, control charts for the measured concentrations and the ranges will be prepared. As recommended by Gilbert (1987) and Gibbons (1994), control charts will be prepared using the logarithms of the measured data in the formulas defined for normal data sets. That is, $x_i$ will be replaced by $\ln(x_i)$ in the formulas for the mean, standard deviation, skewness coefficient, and Shapiro-Wilk statistic. If the latter two values indicate that the $\ln(x_i)$ are distributed normally, then the Shewhart and CUSUM action levels will be based on the means of the $\ln(x_i)$ and the standard deviations of the $\ln(x_i)$. Similarly, the t-test will be conducted using the means and standard deviations of the logarithms of the baseline and verification-monitoring data. If the skewness coefficient and Shapiro-Wilk statistic indicate that neither the $x_i$ nor the $\ln(x_i)$ are distributed normally, nonparametric tests will be applied, as described below.

#### 3.3.3.3 Other Distributions

Simple transformations other than the logarithimic transformation may be considered to try to transform raw baseline data into normally distributed data. However, the statistical analyses required for Weibull, gamma, or beta distributions are sufficiently complex that it is unusual for statisticians to agree as to the power and applicability of the tests. Consequently, nonparametric tests are generally favored when the population distribution is neither normal nor lognormal.

Nonparametric tests are based on the assumption that, although the actual distribution of the population is not known, the population of the baseline data and the monitoring data have the same distribution and a release during transition activities will be recognizable as a concentration anomaly.

To compare baseline and verification monitoring data at a given monitoring station, the Wilcoxon rank-sum test (Gilbert 1987) will be applied. If there are $n_1$ and $n_2$ data in data sets 1 and 2 respectively, consider all $m = n_1 + n_2$ data as one data set. Rank the $m$ data from smallest to largest, sum the ranks of the $n_1$ data from population 1, and denote the sum by $W_{rs}$. If $n_1 \leq 10$ and $n_2 \leq 10$, published tables can be consulted to determine whether the means of populations 1 and 2 can be considered to be significantly different. If $n_1 > 10$ and $n_2 > 10$, then the following statistic is calculated if no ties are present:

$$Z_{rs}=\frac{W_{rs}-n_1(m+1)/2}{\left[n_1 n_2(m+1)/12\right]^{1/2}}$$

If ties are present, the following statistic is calculated:

$$Z_{rs}=\frac{W_{rs}-n_1(m+1)/2}{\left\{\frac{n_1 n_2}{12}\left[m+1-\frac{\sum_{j=1}^{g} t_j(t_j^2-1)}{m(m-1)}\right]\right\}^{1/2}}$$

where $g$ is the number of tied groups and $t_j$ is the number of tied data in the $j$th group.

In either case, the statistic $Z_{rs}$ is compared to the normal variate $Z_{1-\alpha/2}$ at the $1-\alpha/2$ confidence level to determine whether the two populations have significantly different means.

The Wilcoxon rank-sum test is a nonparametric analog of the t-test for normally distributed data, and will be the principal test for comparing baseline and verification-monitoring data that cannot be transformed to normal form. The Wilcoxon rank-sum test will be complemented by the nonparametric Mann-Kendall test for trend (Gilbert 1987). The data at a given monitoring station are listed in the order in which they were collected over time: $x_1, x_2, \ldots, x_i, \ldots, x_n$. Then the sign is determined of each of the $n(n-1)/2$ possible differences $x_j - x_k$, where $j > k$. Let $\text{sgn}(x_j - x_k)$ be defined as follows:

$$\begin{aligned}\text{sgn}(x_j - x_k) &= 1 \text{ if } x_j - x_k > 0\\ &= 0 \text{ if } x_j - x_k = 0\\ &= -1 \text{ if } x_j - x_k < 0.\end{aligned}$$

Then compute the Mann-Kendall statistic

$$S = \sum_{k=1}^{n-1} \sum_{j=k+1}^{n} sgn(x_j - x_k),$$

which is the number of positive differences minus the number of negative differences. The probability associated with n and S is then read from a table (Gilbert 1987), and compared with the desired confidence level.

The Shewhart-CUSUM control charts will also be prepared for the nonparametric data. Either the observed data or their logarithms, depending on which data set is more nearly normal based on the tests for normality noted above, will be used to prepare the control charts. For nonparametric data, the control charts will be used principally to provide visual presentation of the data and to supplement decisions made based on the Wilcoxon rank-sum test.

For baseline data sets with a large number of nondetects, but at least 30 percent detected values, the nonparametric analyses will be applied. However, for COPCs that are detected in fewer than 30 percent of baseline samples, even the nonparametric analyses cannot be applied. In this event, the action level will be assumed to be nondetected values, so that any detected value of the COPC during verification monitoring will be treated as an exceedance of the action level.

The indication that the verification-monitoring mean concentration exceeds the baseline mean concentration, or any other verification-monitoring exceedance of action-level concentrations, will sponsor the same reactions as will the exceedance of the action level for contaminants with either normal or lognormal distributions.

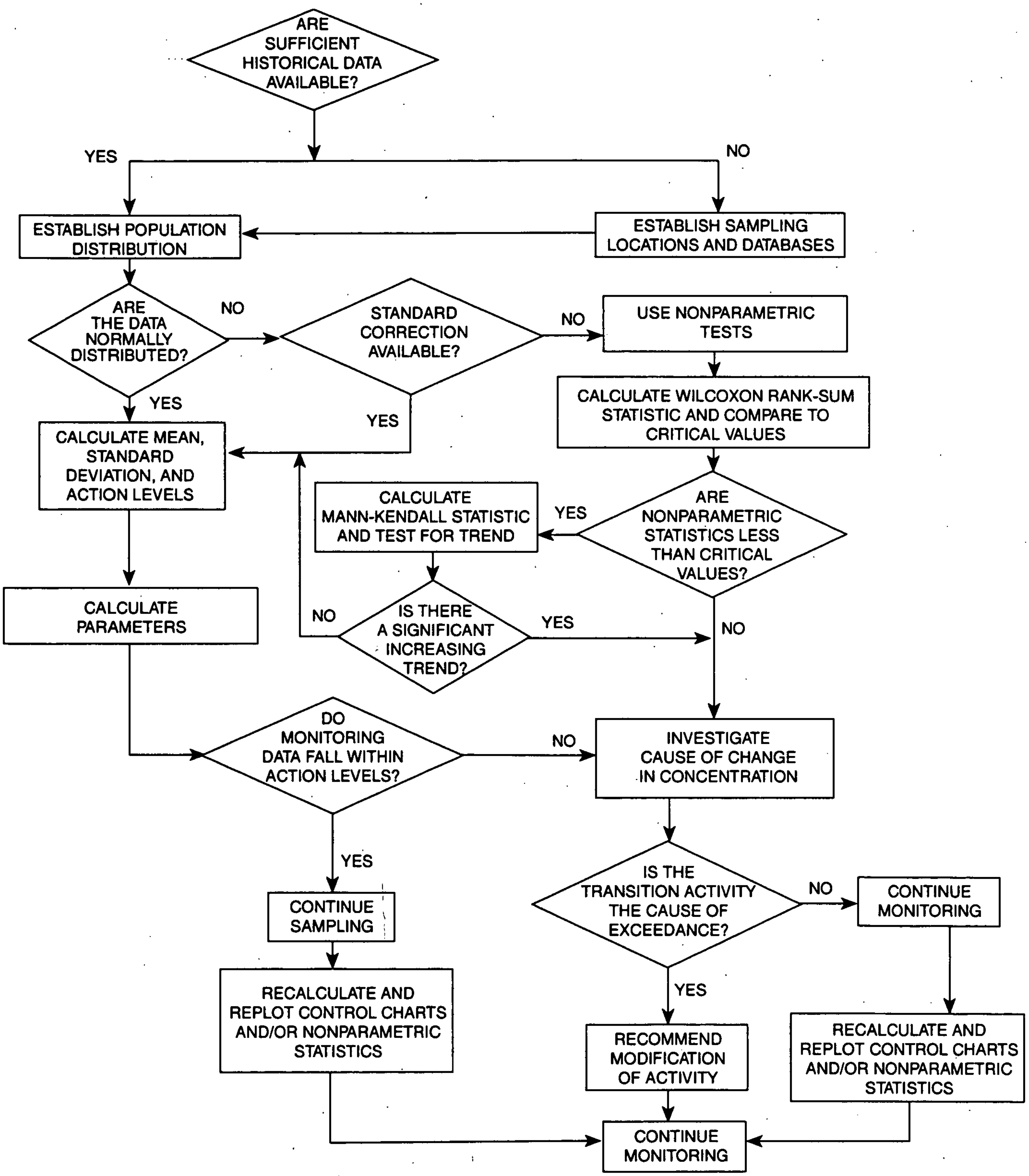
### 3.3.4 Procedure Description/Flowchart

The procedure for developing baselines and action levels for monitoring the various environmental media is based on the development of control charts from either historically measured data in RFEDS or from concentrations measured in samples collected at temporary locations installed before initiation of D&D activities. The analytical data are subjected to the following manipulations (Figure 3-5):

- determination of the population distribution (normal, lognormal, or nonparametric) using probability plots, coefficient of skewness, and the Shapiro-Wilk Test;
- selection of the appropriate statistical tests for normal populations, lognormal populations, and nonparametric populations;
- generation of control charts;
- comparison of measured concentrations to action-level concentrations, or calculation of nonparametric statistics;
- if there is an exceedance, investigation of whether transition activities have caused a release of contamination; and
- if warranted, recommendation of modification of activities to ameliorate the situation.

For groundwater monitoring, a set of existing and/or new monitoring wells will be designated as associated with a specific transition activity. In addition, well points will be installed in the

# FIGURE 3-5
# FLOWCHART FOR ESTABLISHMENT OF BASELINE CONCENTRATIONS AND ACTION LEVELS
# INDUSTRIAL AREA IM/IRA/IP
# ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

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vicinity of the transition activity. Appropriate COPCs will be monitored quarterly and compared with the warning and action limits previously established.

For perennial surface-water conditions, pH and electrical conductivity will be monitored on a real-time basis. Samples will be collected by automated sampling equipment if the action level is exceeded by the real-time data. Flow will also be measured, and the real-time data will be supplemented by data collected when predetermined increases in stream stages are measured or when surface flow is detected in typically dry drainages.

Air will be monitored to supplement routine Selective Alpha Air Monitor (SAAM) monitoring. A SAAM alarm triggers RFETS responses that are outside the scope of this IP. However, routine air monitoring will consist of analyzing samples from Industrial Area fenceline monitoring stations for radiological, metals, and VOC COPCs. The routine air sample concentrations will be compared with baseline and action levels as previously described.

## 3.4 INSTALLATION OF VERIFICATION MONITORING EQUIPMENT

The following sections present the medium-specific verification monitoring programs. The discussions include the types of samples, analyses, monitoring equipment, and data evaluation methods proposed for each medium.

### 3.4.1 Groundwater

The following are the components of the verification monitoring program for the groundwater pathway:

- Identify monitoring wells in the Industrial Area that are located both upgradient and downgradient of the identified transition activity site.

- Extract data for the selected monitoring wells from RFEDS for the past three years.

- Examine all data from 1990 to present for each well location in areas of periodic desaturation.

- Install well points both upgradient (a minimum of one) and downgradient (a minimum of two) near the D&D site.

- Install real-time monitoring equipment in the well points, such as water-level recorders and water quality parameter probes, if required.

- Begin collecting quarterly samples from the well points and any monitoring wells that do not have a sufficient existing baseline data set. In addition, input real-time results into the DSS via RFEDS.

- Before the transition activity begins, compile existing and newly acquired baseline data sets and calculate action limits for COPCs using the baseline methodology.

- After the transition activity has begun, initiate verification monitoring (groundwater verification monitoring consists of collecting quarterly samples from monitoring wells and well points and tabulating real-time results).

- After nonvalidated quarterly groundwater data are available from RFEDS, initiate data compilation, evaluation, and comparison to action levels using the DSS.

- Determine whether any data exceed action levels.

- If data are below action levels, then continue quarterly sampling throughout the transition activity and for a period after the transition activity ends to detect a release if it were to occur on the last day.

- If any data are above action levels, initiate preprogrammed responses described in Section 4.0.

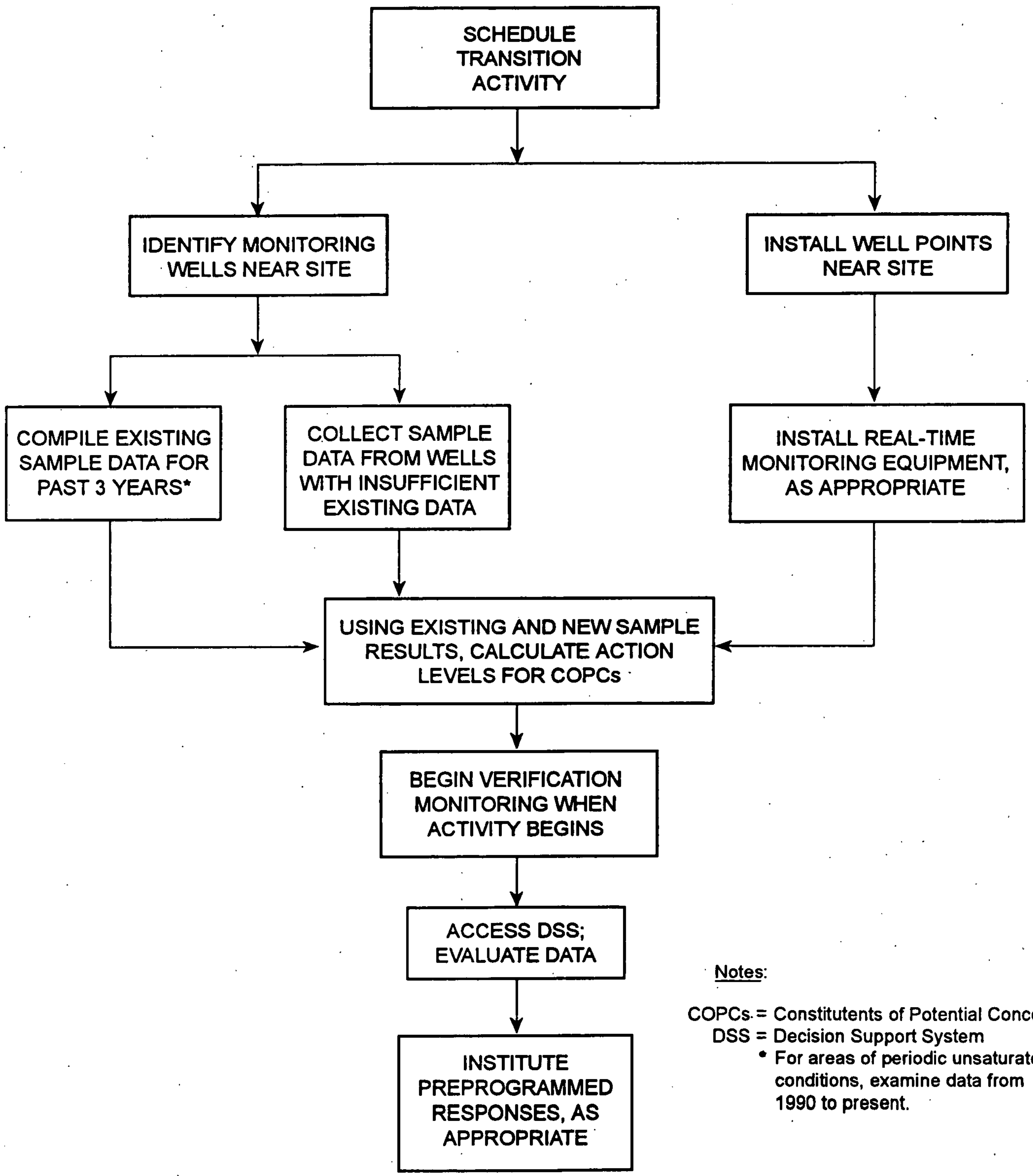
Figure 3-6 shows the verification monitoring components for groundwater. Before the proposed additional Industrial Area monitoring wells are installed, ecological assessments will be conducted at the proposed sites. If the wells may adversely affect ecological resources, the well sites will be moved based on the recommendation of the ecologist.

### 3.4.2 Surface Water

The surface-water verification monitoring program (at the subbasin level) consists of two types of monitoring: routine grab and real-time monitoring. During a transition activity, real-time monitoring equipment will be used to monitor water quality and stream flow in the specified subbasin drainages. For perennial stream-flow conditions (continuous flow), water quality probes and flow measuring equipment will be integrated into the existing radiotelemetry computer system. The following list identifies the components of the verification monitoring program for subbasins with perennial flow conditions:

- Identify potential subbasin sampling locations that are located near the transition activity site and are not influenced by flow from adjacent subbasins or drainages.

## FIGURE 3-6
## GROUNDWATER: VERIFICATION MONITORING
## INDUSTRIAL AREA IM/IRA/IP
## ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE




Notes:

COPCs = Constitutents of Potential Concern
DSS = Decision Support System
* For areas of periodic unsaturated conditions, examine data from 1990 to present.

- Evaluate site access, radiotelemetry and flow measuring capabilities, and potential ecological impacts.

- Install surface-water sampler, flow measuring, and water quality monitoring equipment at the subbasin location and coordinate radiotelemetry integration.

- Establish baseline conditions for real-time monitoring parameters (pH, specific conductance, and radioactivity, if the technology is available) and for the verification monitoring of COPCs. Collect samples at least once per month for verification of COPCs to establish baseline conditions.

- Enter data into the DSS from RFEDS and develop statistically based action levels for COPCs.

- Review historical data from outfall locations (Event-Related Program sampling stations). Develop statistically based action levels for verification monitoring of only those COPCs that were previously analyzed at the outfall locations.

- Initiate verification monitoring once the transition activity begins. If pH, specific conductance, or stream flow are outside preestablished action levels, a warning message will be sent to the radiotelemetry computer. This action will trigger the automated sampler to collect a surface-water sample for laboratory analysis.

- Assess laboratory data for verification monitoring of COPC parameters using DSS. If concentrations are below action levels, continue routine monitoring activities. If concentrations are greater than preestablished action levels, initiate preprogrammed responses described in Section 4.0 of this IP.

- Collect monthly grab samples, at random times, and submit to the laboratory for analysis. COPC concentrations should be reviewed against preestablished action levels.

Most of the surface-water locations in the Industrial Area are characterized by ephemeral stream conditions from storm runoff or snow melt. For most of the year, these surface-water systems are primarily dry or contain very little flow. The verification monitoring approach for these systems relies primarily on the detection of flow and the initiation of an automated sampler. The following list identifies the components of the verification monitoring program for subbasins with ephemeral flow conditions:

- Identify potential subbasin sampling locations that are located near the transition activity site and are not influenced by flow from adjacent subbasins or drainages.

- Evaluate site access, radiotelemetry and flow measuring capabilities, and potential ecological impacts.

- Install surface-water sampler and flow measuring equipment at subbasin location and coordinate radiotelemetry integration.

- Collect samples when flow conditions exist (primarily storm events). Attempt to collect samples that represent a seasonal variation. Test for water quality indicators (pH, specific conductance, and radioactivity if technology is available) in the field while collecting laboratory samples for COPC testing.

- Establish baseline conditions for water quality indicators (pH, specific conductance, and radioactivity if technology is available) and for the verification monitoring of COPCs.

Attempt to collect at least 12 samples during an 18-month period to establish baseline conditions for COPCs and water quality indicators.

- Input COPC and water quality indicator data into the DSS from RFEDS and develop statistically based action levels for COPCs.

- Review historical data from outfall locations (Event-Related Program sampling stations). Develop statistically based action levels for verification monitoring of only those COPCs that were previously analyzed at the outfall locations.

- Initiate verification monitoring once transition activity begins.

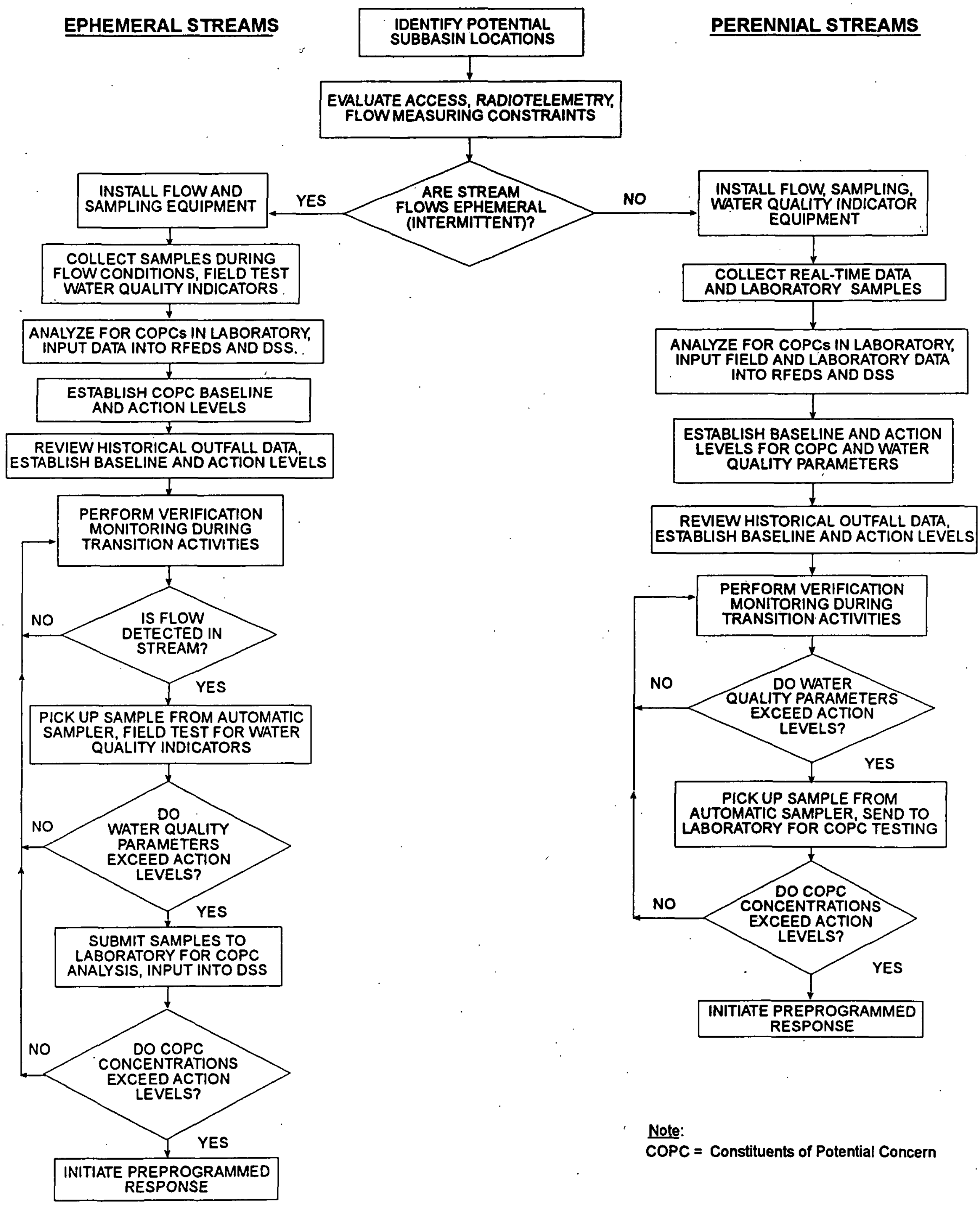
- Collect surface-water sample based on flow conditions via radiotelemetry computer system. If pH, specific conductance, or radioactivity values as tested in the field are outside preestablished action levels, the sample will be sent to the laboratory for COPC analysis.

- Assess laboratory data for verification monitoring of COPC parameters using DSS. If concentrations are below action levels, continue routine monitoring activities. If concentrations are greater than preestablished action levels, initiate preprogrammed responses described in Section 4.0.

- Collect monthly grab samples, if possible, at random times and submit to the laboratory for COPC analysis. COPC concentrations should be reviewed against preestablished action levels.

Figure 3-7 shows the verification monitoring components for surface water (perennial and ephemeral conditions). Before the surface-water sampling stations are constructed, ecological

**FIGURE 3-7**
**SURFACE WATER: SUBBASIN VERIFICATION MONITORING**
**INDUSTRIAL AREA IM/IRA/IP**
**ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE**




Note:
COPC = Constituents of Potential Concern

evaluations will be conducted. If these potential sampling locations affect the RFETS ecology in the Industrial Area, the sample site will be relocated based on the recommendations of the site ecologist.

### 3.4.3 Incidental and Foundation Drain Water

Buildings undergoing transition activities have a high probability of containing floor or foundation drains. These drains represent a potential contaminant pathway from the site. These drains can flow directly into the sanitary sewer system, surface waters, or onto surface soils. To avoid contaminant releases into the building drains, the IM/IRA Incidental and Foundation Drain Water Manager will be involved in the early stages of the transition activity process. The following list identifies the IM/IRA Incidental and Foundation Drain Water Manager's actions:

- Review the building's engineering drawings and reference the Drain Identification Study. Locate building drainage and piping that may be a contaminant pathway to the environment.

- Coordinate with the IM/IRA Project Manager and other managers involved with transition activities to develop drain pathway protection procedures for the building.

- Verify that all drainage connections to the foundation drains and sanitary sewer have been properly sealed off by the transition activity project.

- Notify the manager of the wastewater treatment plant about the transition activity. If high concentrations or unusual chemicals are detected in the water treatment plant's influent or effluent the transition activities may be a potential source.

- Manage water generated from the transition activity according to the three-tier disposition procedure for incidental waters.

### 3.4.4 Air

The following are the components of the verification monitoring program for the air pathway:

- Initiate sample analysis of VOC air samples at locations S-008-V, S-104-V, S-116-V, S-205-V and S-301-V.

- Identify COPCs associated with the building, subbasin, and OU, as appropriate.

- Before a transition activity begins, use both existing and newly acquired sample data from RFEDS to calculate action levels for COPCs using baseline methodology.

- As the transition activity begins, initiate the VOC verification monitoring program (Summa™ canister monitoring samples will be based on a time-integrated period that correlates to the transition activity). Identify RAAMP samples on which accelerated laboratory analysis can be performed to support verification monitoring.

- After nonvalidated results for air samples are available from RFEDS, initiate data reduction, compilation, evaluation, and comparison to action levels using the DSS.

- Determine whether any data exceed action levels.

- If data are below action levels, continue routine analysis of air samples throughout the transition activity.

- If any data are above action levels, initiate preprogrammed responses described in Section 4.0.

Figure 3-8 shows the verification monitoring components for air.

## 3.5 VERIFICATION MONITORING MODEL SCHEDULE

There are several factors that will influence the development of a verification monitoring schedule, such as (1) the type of transition activity, (2) the location of the activity, (3) ecological concerns, and (4) the environmental risk associated with the transition activity. Because the transition activity schedule is not finalized, it is not possible to develop a site-specific verification monitoring schedule. To estimate the time needed to establish a verification monitoring program, a model duration schedule is presented in Gantt Chart form in Figure 3-9. For purposes of demonstration, January 1, 1996 was used as the start date for the verification monitoring program. The Gantt Chart details the medium-specific activities, start and finish dates, calendar day duration, and time-line bar graph.

This model schedule provides the IM/IRA Project Manager with activity durations necessary to install the verification monitoring program after a transition activity has been announced. The model duration schedule is based on the following assumptions:

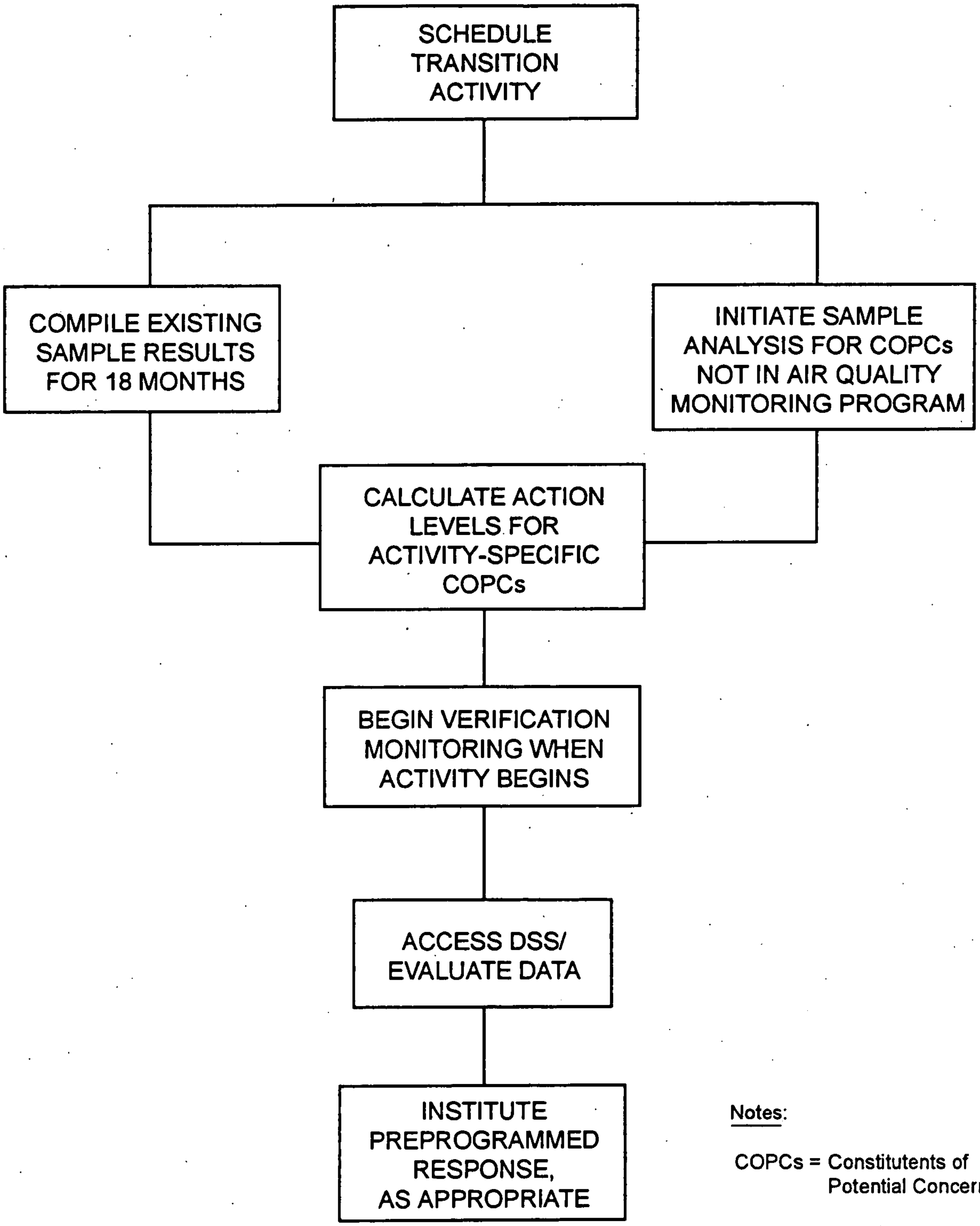
- COPCs will be developed using the procedure outlined in Section 3.2.

- The acquisition of equipment and subcontractors was estimated to require two months.

- Establishing the groundwater baseline will require reactivating monitoring wells and sampling on a quarterly basis for one year.

Final

# FIGURE 3-8
## AIR: VERIFICATION MONITORING
## INDUSTRIAL AREA IM/IRA/IP
## ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE




Notes:

COPCs = Constitutents of Potential Concern

DSS = Decision Support System

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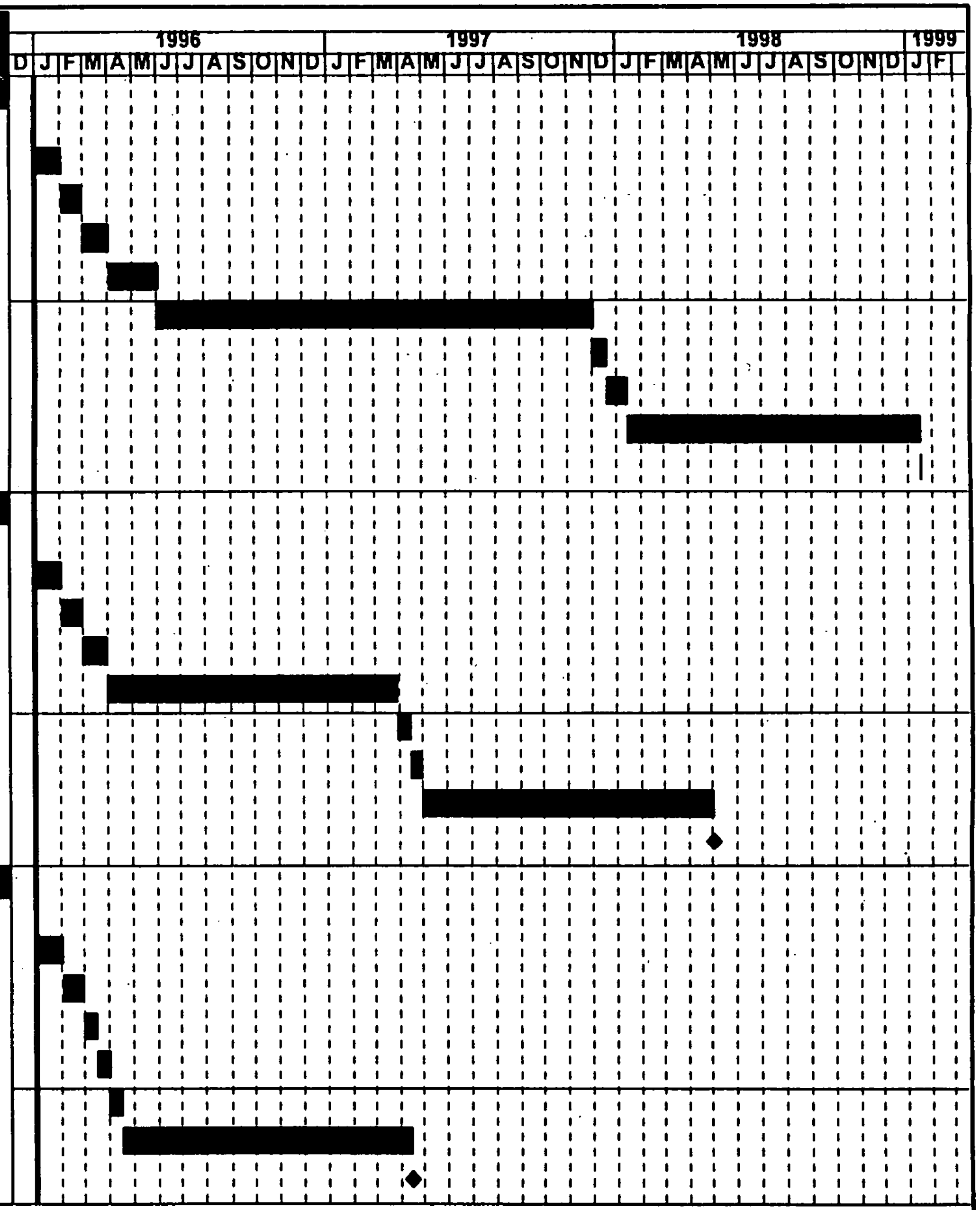
| Activity Description | Orig Dur | Early Start | Early Finish |
|---|---|---|---|
| **Surface Water Subbasin Verification Monitoring** | | | |
| Transition activity scheduled | 1 | 01JAN96 | 01JAN96 |
| Development IM/IRA verification monitoring plan | 32 | 02JAN96 | 02FEB96 |
| Development of COPC list | 27 | 03FEB96 | 29FEB96 |
| Evaluate subbasin monitoring location | 32 | 01MAR96 | 01APR96 |
| Instrument acquisition/setup/real time telemetry | 62 | 02APR96 | 02JUN96 |
| Collect baseline data | 549 | 02JUN96 | 02DEC97 |
| Establish baseline/Action limits | 19 | 02DEC97 | 20DEC97 |
| Incorporate into DSS | 26 | 21DEC97 | 15JAN98 |
| Transition activity/Verif. Monitoring starts | 366 | 16JAN98 | 16JAN99 |
| Transition activity ends/Eqpmt demobilization | 1 | 17JAN99 | 17JAN99 |
| **Air Verification Monitoring** | | | |
| Transition activity scheduled | 1 | 01JAN96 | 01JAN96 |
| Development of IM/IRA verification monitoring | 32 | 02JAN96 | 02FEB96 |
| Development of COPC list | 27 | 03FEB96 | 29FEB96 |
| Add COPC's to Monitoring Plan | 31 | 01MAR96 | 31MAR96 |
| Obtain baseline data for COPC's | 365 | 31MAR96 | 30MAR97 |
| Calculate control/warning limits | 16 | 31MAR97 | 15APR97 |
| Incorporate data into DSS | 15 | 16APR97 | 30APR97 |
| Transition activity begins/Air verif. monitoring | 366 | 01MAY97 | 01MAY98 |
| Transition activity ends | 0 | | 01MAY98 |
| **Surface Water Outfall Verification Monitoring** | | | |
| Transition activity scheduled | 1 | 01JAN96 | 01JAN96 |
| Development of IM/IRA verification monitoring | 32 | 02JAN96 | 02FEB96 |
| Development of COPC list | 27 | 03FEB96 | 29FEB96 |
| Extract previous data from RFEDS | 17 | 01MAR96 | 17MAR96 |
| Calculate control/warning limits | 15 | 18MAR96 | 01APR96 |
| Incorporate data into DSS | 15 | 01APR96 | 15APR96 |
| Transition activity / Verif. monitoring starts | 366 | 16APR96 | 16APR97 |
| Transition activity / Verif. monitoring ends | 0 | | 16APR97 |




| | |
|---|---|
| Project Start | 01MAR95 |
| Project Finish | 18JAN99 |
| Data Date | 31DEC95 |
| Plot Date | 22JUN95 |

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Early Bar
Progress Bar
Critical Activity

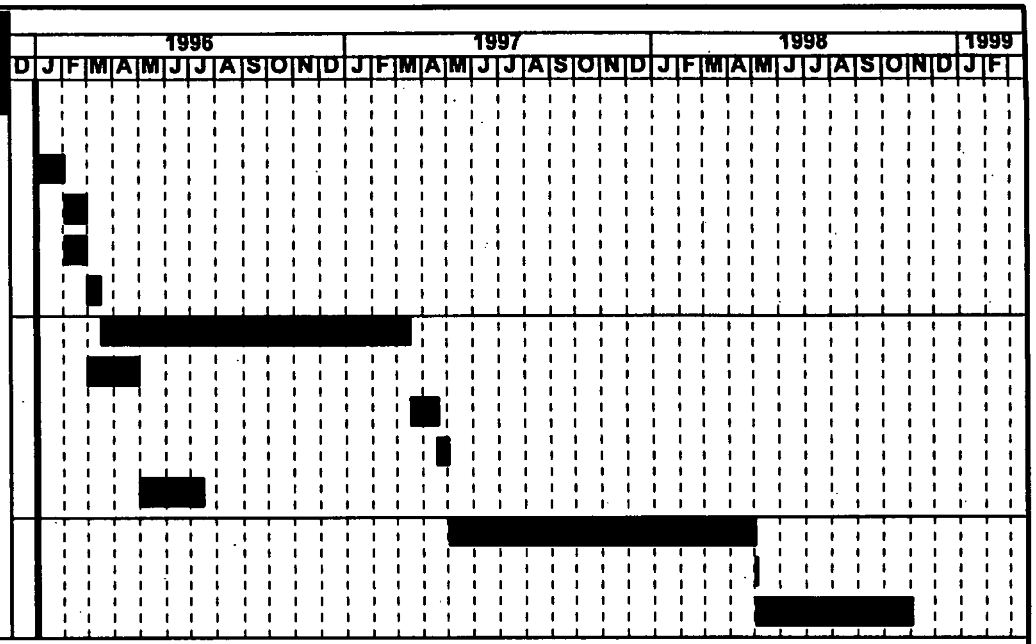
IMDS

Sheet 1 of 2

Figure 3-9
IM/IRA Model Implementation Schedule
Rocky Flats Environmental Tech. Site

| Date | Revision | Checked | Approved |
|---|---|---|---|
| | | | |

| Activity Description | Orig Dur | Early Start | Early Finish |
|---|---|---|---|
| **Groundwater Verification Monitoring** | | | |
| Transition activity scheduled | 1 | 01JAN96 | 01JAN96 |
| Development of IM/IRA verification monitoring | 32 | 02JAN96 | 02FEB96 |
| Development of COPC list | 27 | 03FEB96 | 29FEB96 |
| Evaluate/Select wells in vicinity | 27 | 03FEB96 | 29FEB96 |
| Extract previous data from RFEDS | 17 | 01MAR96 | 17MAR96 |
| Quarterly sampling of wells not in program | 366 | 18MAR96 | 18MAR97 |
| Procure subcontractors/equipt for well points | 62 | 01MAR96 | 01MAY96 |
| Calculate control/warning limits for COPC's | 32 | 19MAR97 | 19APR97 |
| Incorporate data into DSS | 13 | 19APR97 | 01MAY97 |
| Install/Sample well points/Assess data | 75 | 02MAY96 | 15JUL96 |
| Transition activity begins | 366 | 02MAY97 | 02MAY98 |
| Transition activity ends | 1 | 03MAY98 | 03MAY98 |
| Post transition activity monitoring | 185 | 03MAY98 | 03NOV98 |




| | |
|---|---|
| Project Start | 01MAR95 |
| Project Finish | 18JAN99 |
| Data Date | 31DEC95 |
| Plot Date | 22JUN95 |

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Early Bar
Progress Bar
Critical Activity

IMDS

Sheet 2 of 2

Figure 3-9
IM/IRA Model Implementation Schedule
Rocky Flats Environmental Tech. Site

| Date | Revision | Checked | Approved |
|---|---|---|---|
| | | | |
| | | | |
| | | | |



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- The transition activity will last exactly one year.

- The DSS, used to manage and display monitoring data, will be on-line and working according to expected technical requirements.

- Ecological assessments are considered part of the monitoring location review. No extra time has been estimated based on relocating the monitoring system because of unexpected ecological concerns (e.g., bird migration, eagle nesting).

## 3.6 PROJECTED FIVE-YEAR SCHEDULE FOR TRANSITION ACTIVITIES

As discussed in Section 1.0, transition activities are currently planned for the Industrial Area. Examples of those programs include the following:

- Building 779, Rooms 152 and 154 Pilot Project;
- Building 777, Room 415/416;
- Building 889;
- IPP;
- removal of condensate tanks; and
- removal of sodium-hydroxide tanks.

Project schedules for these programs have been included in Appendix E.

## 3.7 REFERENCES

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# 4.0 DECISION SUPPORT SYSTEM

The objective of the DSS is to provide a central, computer-based mechanism for evaluating and distributing the results of the verification monitoring program. Additionally, the DSS will allow personnel to make decisions based on the monitoring results and initiate preprogrammed response actions. After the verification monitoring programs are installed for the air, surface-water, and groundwater pathways, baseline data sets are available, and the transition activity begins, preprogrammed responses will be initiated. There is a specific set of preprogrammed responses for each medium. Preprogrammed responses are shown in Figures 4-1, 4-2, 4-3, and 4-4 and discussed in detail in Section 9.0 of the IM/IRA/DD (DOE 1994). Preprogrammed responses may include any of the following: collecting additional samples, evaluating additional data, and investigating sources. Preprogrammed responses for each medium will be entered into the DSS. The DSS will use the components of the preprogrammed responses to allow IM/IRA personnel to notify and communicate with the appropriate departments and divisions at RFETS. The following sections describe the DSS, present a schedule for developing and implementing the DSS, and identify the parties responsible for using the DSS during verification monitoring.

## 4.1 DESCRIPTION OF THE DECISION SUPPORT SYSTEM

The DSS is a computer-based information system that will generate and maintain information for management and decision making by establishing flexible links between data and the various uses of those data. The following are the information management requirements of the IM/IRA program:

- efficient collection, storage, and retrieval of environmental monitoring data that originate from various sources, ranging from real-time monitoring via radiotelemetry to periodic laboratory reports for air, surface-water, and groundwater sampling;

# FIGURE 4-1
## PREPROGRAMMED RESPONSE AND ADMINISTRATIVE LINKAGE
## INDUSTRIAL AREA IM/IRA/IP
## ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

**COMMUNICATION ORGANIZATION CHART**

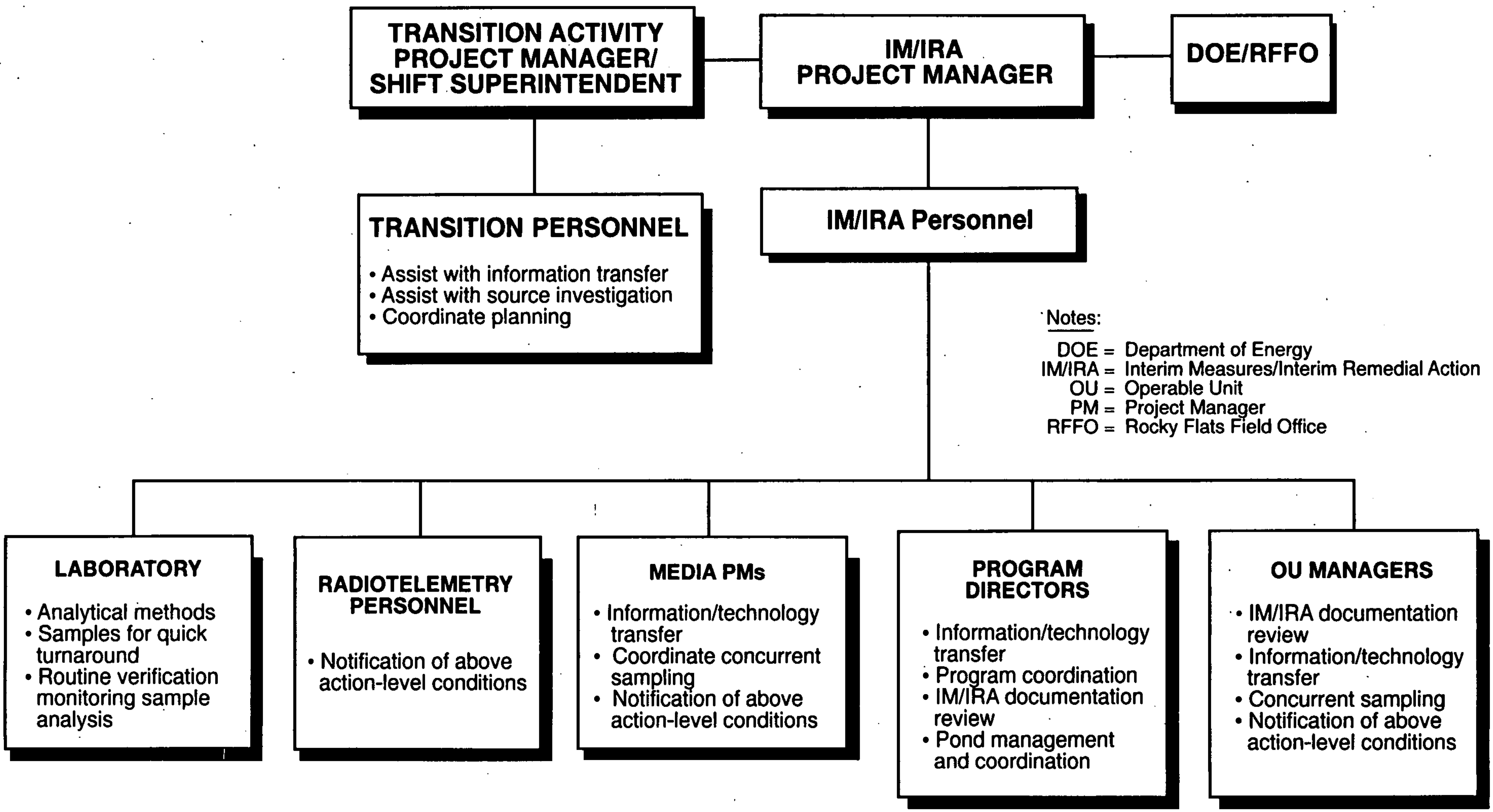


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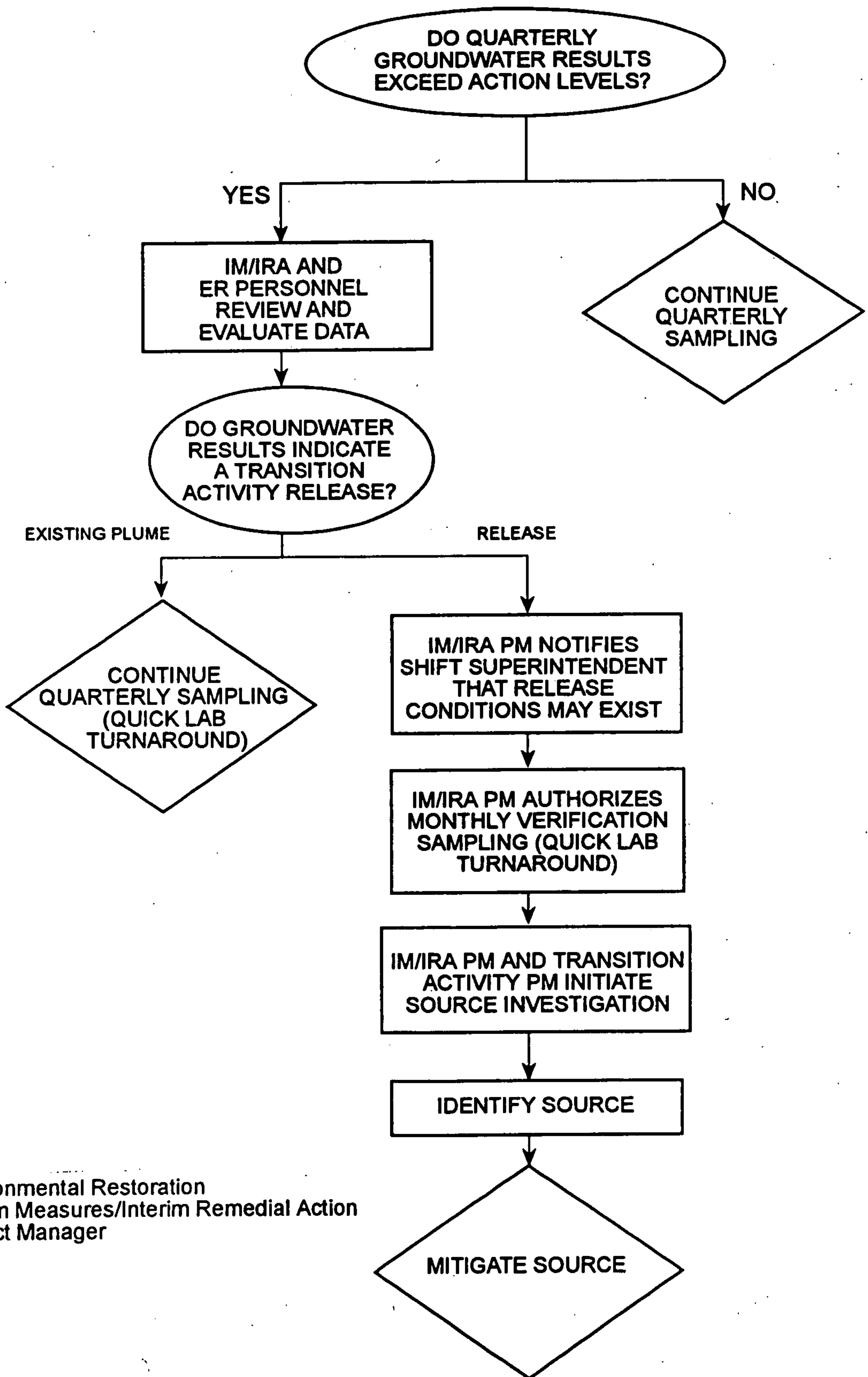
**FIGURE 4-2**
**PREPROGRAMMED RESPONSE-**
**GROUNDWATER VERIFICATION MONITORING**
**INDUSTRIAL AREA IM/IRA/IP**
**ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE**




ER = Environmental Restoration
IM/IRA = Interim Measures/Interim Remedial Action
PM = Project Manager

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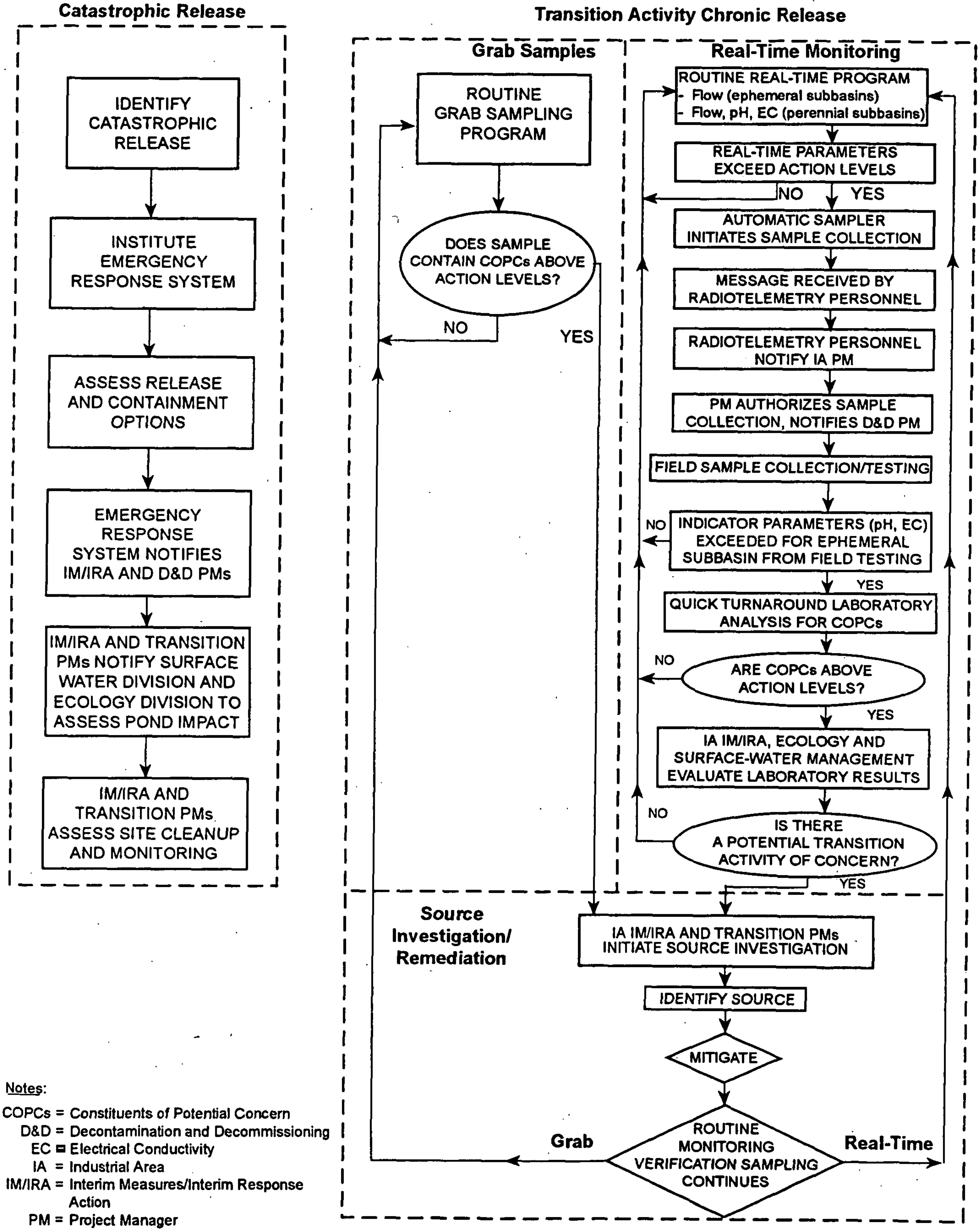
# FIGURE 4-3
## PREPROGRAMMED RESPONSE - SURFACE-WATER VERIFICATION MONITORING
## INDUSTRIAL AREA IM/IRA/IP
## ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE




Notes:

COPCs = Constituents of Potential Concern
D&D = Decontamination and Decommissioning
EC = Electrical Conductivity
IA = Industrial Area
IM/IRA = Interim Measures/Interim Response Action
PM = Project Manager

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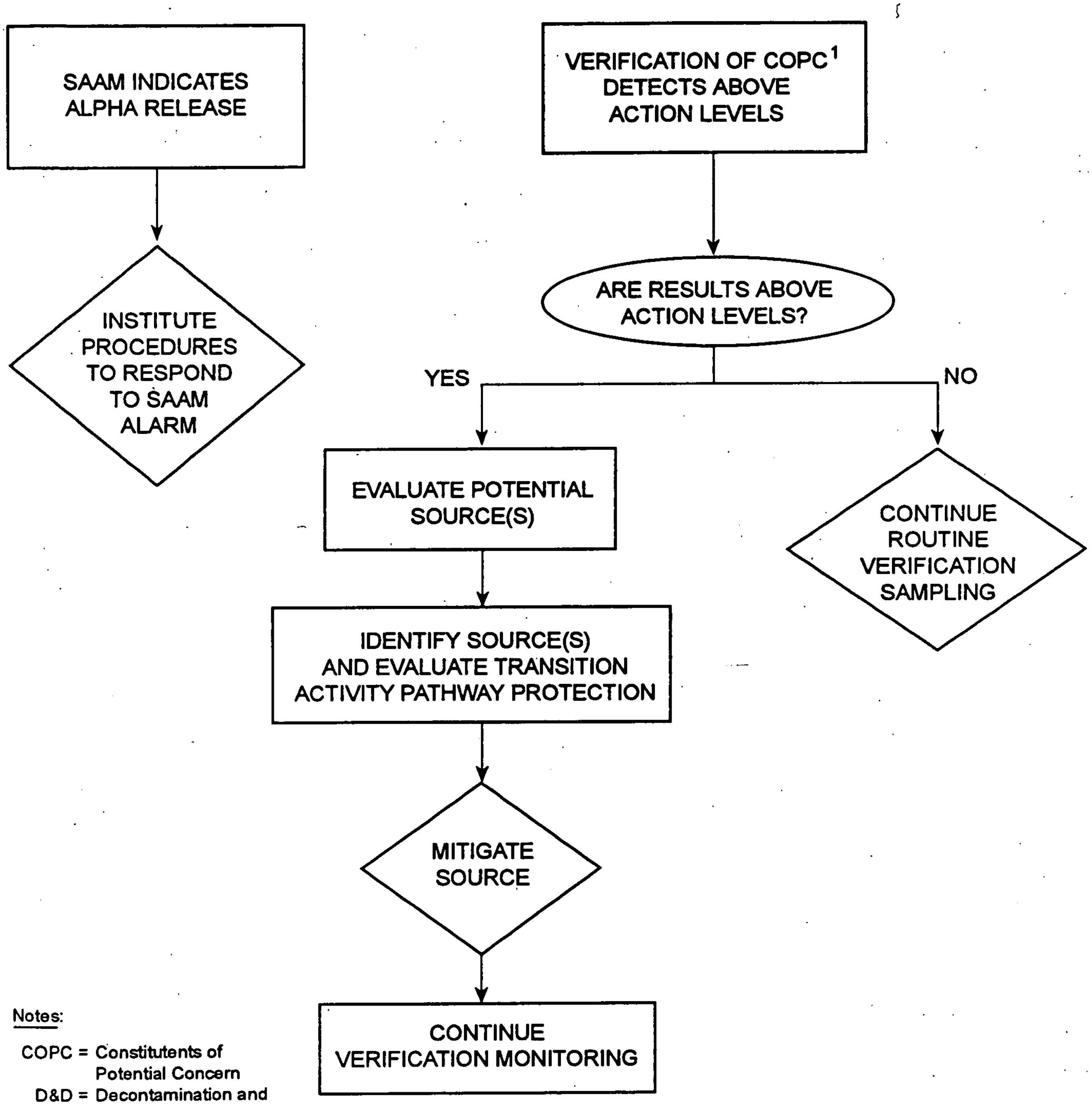
## FIGURE 4-4
## PREPROGRAMMED RESPONSE: AIR VERIFICATION MONITORING
## INDUSTRIAL AREA IM/IRA/IP
## ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE




Notes:

COPC = Constitutents of Potential Concern
D&D = Decontamination and Decommissioning
SAAM = Selective Alpha Air Monitor

[1] Routine verification monitoring consists of samples that are collected from the Routine Program monitoring sites and analyzed for radiological activity-specific COPCs, and event-based VOC sampling using Summa™ canisters.

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- flexibility to accommodate data streams that will differ between transition activities;
- scheduling information maintained for monitoring activities;
- automated or semiautomated data processing capabilities, potentially including data conversion, QA/quality control (QC) procedures, data aggregation, baseline and action-level determinations, control charts, and other graphical displays;
- monitoring network maintenance information;
- automated comparison of verification monitoring results to action levels;
- inventory of monitoring equipment and map of the monitoring network system for transition activities;
- an alert or alarm capability to notify appropriate users that out-of-limit conditions may exist and specify preprogrammed responses;
- two-way links to other data sources such as RFEDS to retrieve archived monitoring data or modeling results used to develop action levels, investigate situations where action levels have been exceeded, or supply summaries of baseline monitoring data and activities;
- automated report generation; and
- access control and maintenance of chain-of-custody information for samples.

The proposed DSS will be designed and developed by CU's CADSWES in Boulder, Colorado. The system will use a geo-relational database to maintain and organize the information from transition activity verification monitoring. The database will be maintained in real time through the use of several automated and semiautomated procedures that will collect, archive, and refresh data. Applications will be arranged around the database and will interact with the database through the use of data management interface software. The information system will be accessed through a variety of hardware and software platforms connected by a local or wide-area network. Because different transition activities will have different starting times, durations, and termination dates, flexibility will be required to support the dynamic addition and editing of new verification monitoring programs to the system. Figure 4-5 shows the data-centered conceptual verification monitoring DSS. The DSS will be developed to address the specific needs of all three media. As discussed in Section 3.4, each medium will require a specific monitoring program and sample collection schedule. DSS users will be able to access the type of information required for the specific medium-monitoring program.

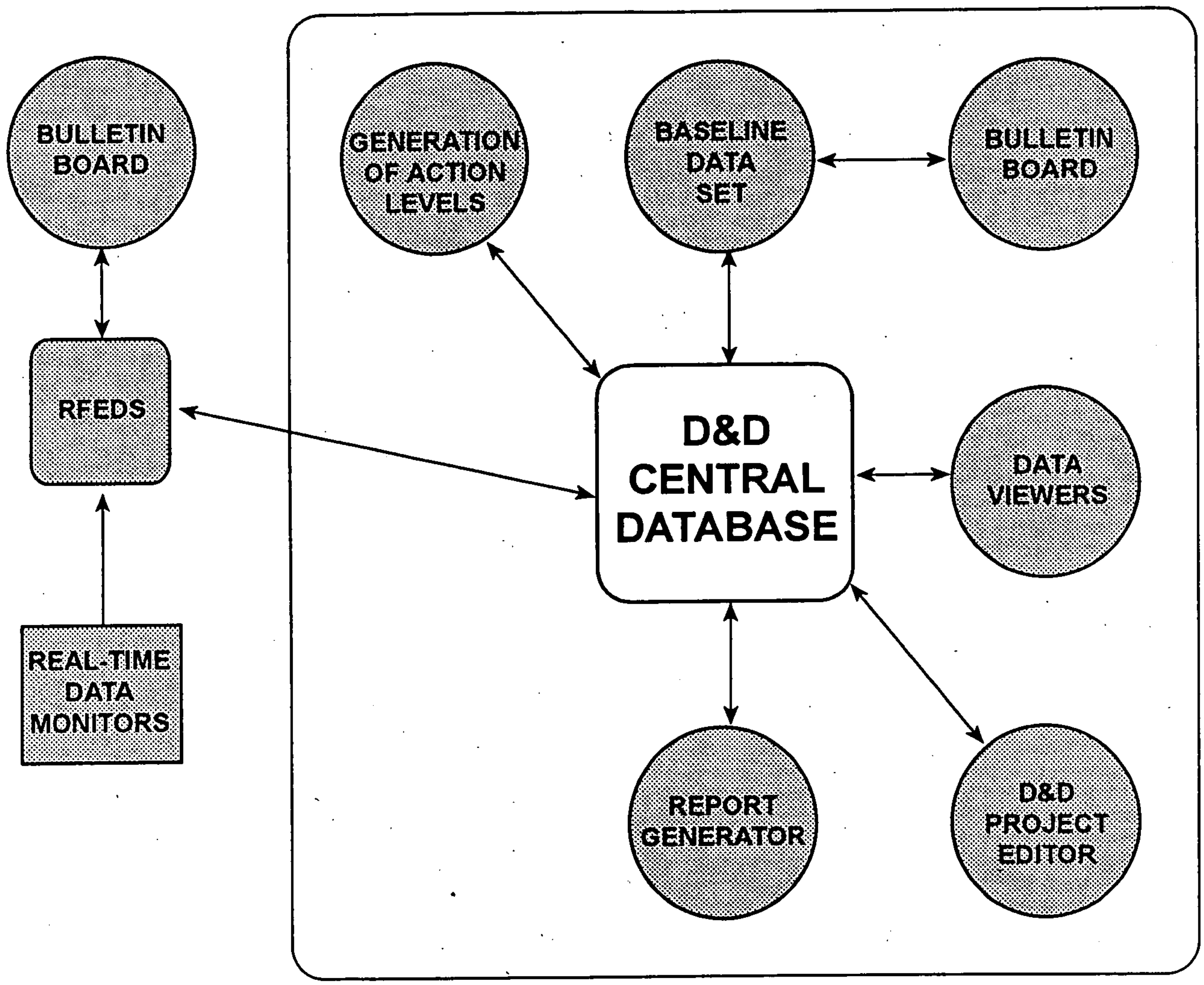
## 4.2 IMPLEMENTATION SCHEDULE FOR THE DECISION SUPPORT SYSTEM

The DSS for the IM/IRA Project is being developed by CU/CADSWES. Figure 4-6 shows the proposed schedule for the DSS development, testing, and implementation.

## 4.3 REFERENCES

U.S. Department of Energy. 1994 (September). *Proposed Interim Measures/Interim Remedial Action Decision Document for the Rocky Flats Industrial Area.* Environmental Restoration Division. Golden, Colorado.

**FIGURE 4-5**
**IM/IRA DECISION SUPPORT SYSTEM**
**INDUSTRIAL AREA IM/IRA/IP**
**ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE**




Notes:

D&D = DECONTAMINATION AND DECOMMISSIONING
RFEDS = ROCKY FLATS ENVIRONMENTAL DATA SYSTEM

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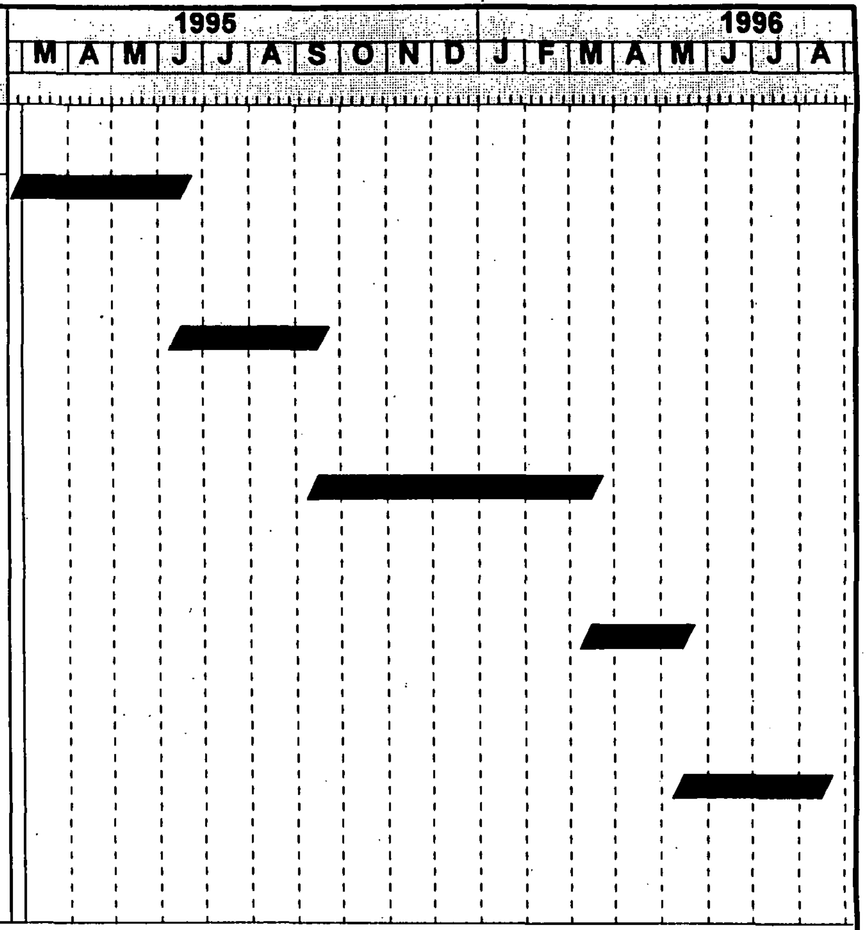
| Activity Description | Orig Dur | Early Start | Early Finish |
|---|---|---|---|
| NEEDS ANALYSIS / HIGH LEVEL DESIGN | 107 | 01MAR95 | 15JUN95 |
| DETAILED DESIGN/INITIAL DATABASE IMPLEMENTATION | 92 | 16JUN95 | 15SEP95 |
| DECISION SUPPORT SYSTEM DEVELOPMENT | 182 | 16SEP95 | 15MAR96 |
| DECISION SUPPORT SYSTEM INTEGRATION TESTING | 61 | 16MAR96 | 15MAY96 |
| DECISION SUPPORT SYSTEM IMPLEMENTATION | 92 | 16MAY96 | 15AUG96 |




Project Start 01MAR95
Project Finish 15AUG96
Data Date 01MAR95
Plot Date 24MAR95

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FIGURE 4-6
DECISION SUPPORT SYSTEM
DEVELOPMENT-IMPLEMENTATION SCHEDULE

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# 5.0 IMPLEMENTATION PLAN RESPONSIBILITIES FOR PROPOSED ACTIONS

The IM/IRA Project is multidisciplinary, using internal technical expertise from several environmental fields. The IM/IRA Project depends on technical support entities to ensure that many of the proposed actions presented in the IM/IRA/DD (DOE 1994) will be performed. The purpose of this section is to describe responsibilities for specific technical personnel at RFETS who will implement the IM/IRA/DD proposed actions. Figure 5-1 is an organization chart of the IM/IRA Project personnel whose mission is to implement the IM/IRA/DD proposed actions. It is understood that changes in the DOE contract may affect individuals identified in this section. It is assumed that any reorganization will ultimately provide the appropriate level of project staff. The individuals and responsibilities of the IM/IRA Project team leaders are described in the following sections:

IM/IRA Project Manager (Mark Buddy: 966-8519). The following are the IM/IRA Project Manager's responsibilities:

- As Program Manager, EG&G Environmental Restoration Programs, manage the IM/IRA Project.

- Acquire funding, coordinate, and implement overall the proposed actions specified in the IM/IRA/DD.

- Serve as focal point for DOE and the transition activity program managers for verification monitoring.

- Direct and manage the preprogrammed responses if COPC concentrations exceed action levels.

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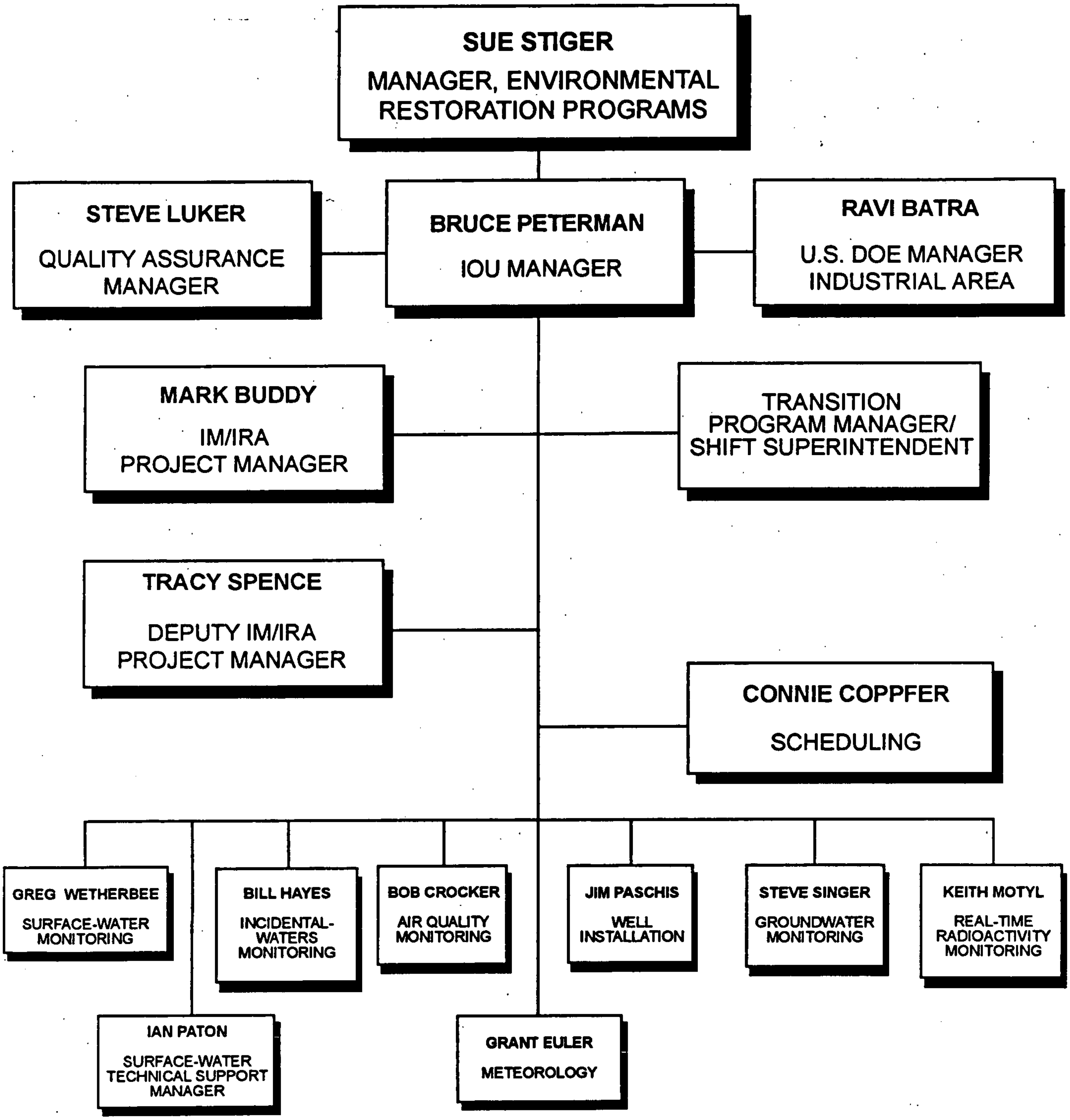
# FIGURE 5-1
# PROJECT ORGANIZATION CHART
# INDUSTRIAL AREA IM/IRA/IP
# ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE




Notes:

D&D = Decontamination and Decommissioning
DOE = U.S. Department of Energy
IM/IRA = Interim Measures/Interim Response Action
IOU = Integrated Operable Unit

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- Keep DOE apprised on IP progress.
- Support DOE during meetings with EPA and CDPHE.
- Coordinate and manage subcontractor activities.
- Develop annual IM/IRA Project status reports for DOE for ultimate transmittal to the regulatory agencies.
- Coordinate with the EG&G groundwater monitoring group to schedule the sampling and routine monitoring of 11 new wells and 25 existing wells in the Industrial Area.
- Serve as primary contact for the DSS implementation.
- Assess transition activities and determine the level of verification monitoring needed.
- Provide support to DOE in developing annual status reports.
- Develop verification monitoring work plans for transition activity projects.

Transition Program Managers. (D&D: Tony Tome; Residue Elimination: Jeanne Ball; National Conversion Pilot Project: Jim Warnbach; Plutonium Stabilization: Steve Wing; Solution Stabilization: Bob Leonard.) The following lists the Transition Program Managers and their IM/IRA responsibilities:

- Serve as the focal point for the IM/IRA Project.

- Coordinate and communicate with the IM/IRA Project Manager about verification monitoring activities.

- Develop and disseminate transition activity scheduling information.

- Maintain open communication with IM/IRA Project Manager about transition program progress, problems, and pathway protection issues.

Department of Energy: Industrial Area Program Manager (Ravi Batra: 966-9664). The following are the DOE Industrial Area Program Manager's IM/IRA responsibilities:

- Acquire DOE funding to allow the IM/IRA Project to implement the proposed actions for establishing and maintaining verification monitoring programs.

- Communicate with EPA and CDPHE about IM/IRA Project status.

- Provide a focal point within DOE to coordinate activities and address internal problems that could affect the IM/IRA Project.

Scheduling Engineer (Connie Coppfer: 966-9108). The following are the Scheduling Engineer's IM/IRA responsibilities:

- Maintain and update IP schedules for the IM/IRA Project Manager on a routine basis.

- Discuss schedule status with IM/IRA Project Manager on a monthly basis.

Quality Assurance Manager (Steve Luker: 966-8625). The following are the QA Manager's IM/IRA responsibilities:

- Review the final IP against EG&G/DOE QA criteria.

- Support the IM/IRA Project Manager for document reviews and revisions of controlled documents.

- Maintain a document control file for the IM/IRA Project.

- Coordinate the development of document modification requests (DMRs).

<u>IM/IRA Surface-Water Project Manager (Greg Wetherbee: 966-3687)</u>. The following are the IM/IRA Surface-Water Project Manager's responsibilities:

- Develop final work plan that includes the implementation approach for the IM/IRA proposed actions.

- Serve as focal point for surface-water monitoring issues including outfall sampling, subbasin monitoring (Section 3.0), and seep and spring monitoring.

- Manage funding and manpower resources needed to implement and maintain IM/IRA Project proposed actions for surface-water monitoring.

- Inform the IM/IRA Project Manager about the progress of implementation, funding, and scheduling issues for the proposed actions.

- Coordinate the ecological and NEPA assessments of proposed surface-water monitoring stations.

- Review and evaluate verification monitoring data via the DSS.

- Acquire equipment and install the outfall surface-water monitoring (under the Event-Related Program).

- Initiate and direct preprogrammed responses if COPC concentrations exceed action levels.

- Notify the IM/IRA Project Manager concerning the initiation of any preprogrammed responses.

IM/IRA Incidental and Foundation Drain Water Project Manager (Bill Hayes: 966-2181). The following are the IM/IRA Incidental and Foundation Drain Water Project Manager's responsibilities:

- Serve as focal point for the IM/IRA Project Manager for issues concerning incidental and foundation drain waters.

- Coordinate with the surface-water program management and technical representative about characterizing and disposing of incidental and foundation waters.

- Manage funding and manpower resources needed to implement and maintain proposed actions for IM/IRA Project for incidental and foundation water management.

- Develop final work plan that includes the implementation approach for the IM/IRA Project proposed actions.

- Inform the IM/IRA Project Manager about the progress of implementation, funding, and scheduling issues for the proposed actions.

- Coordinate the ecological and NEPA assessments of proposed incidental and foundation drain water monitoring and sampling locations.

- Review building diagrams and assess drain locations and outfalls that can be used to support the IM/IRA Project.

IM/IRA Air Monitoring Project Manager (Bob Crocker; 966-3933). The following are the Air Monitoring Project Manager's IM/IRA responsibilities:

- Manage the implementation and routine monitoring of RAAMP and non-RAAMP air monitoring.
- Develop a final work plan that includes the implementation approach for the IM/IRA Project proposed actions.
- Inform the IM/IRA Project Manager about the progress of implementation, funding, and scheduling issues for the proposed actions.
- Coordinate the ecological and NEPA assessments for air monitoring and sampling locations.
- Serve as primary DSS reviewer for the IM/IRA air monitoring program.
- Review and evaluate verification monitoring data via the DSS.
- Initiate and direct preprogrammed responses if COPC concentrations exceed action levels.
- Notify the IM/IRA Project Manager concerning the initiation of any preprogrammed responses.

Air Quality/Meteorology Technical Support (Grant Euler; 966-3926). The responsibilities of the Air Quality engineer are as follows:

- Coordinate data input and review systems development for DDS Meteorology modules.
- Support development and integration of Air Quality/Meteorology database systems (Laboratory Information Management Services [LIMS]/RFEDs).

- Support technical monitoring systems, and verification of event-based sampler implementation.

- Provide input on dispersion modeling for the Industrial Area.

WARP Project Manager (Jim Paschis: 966-8644). The responsibilities of the WARP Project Manager for IM/IRA activities are as follows:

- Manage the installation and development of 11 new monitoring wells in the Industrial Area.

- Coordinate with the IM/IRA Project Manager and OU managers about the placement and construction of the 11 new wells.

- Coordinate the ecological and NEPA assessments of the proposed monitoring and sampling locations, as appropriate.

- Inform the IM/IRA Project Manager about the progress of implementation, progress, funding, and scheduling issues for the proposed actions.

Groundwater Sampling Manager (Steve Singer: 966-8635). The following are the Groundwater Sampling Manager's IM/IRA responsibilities:

- Manage the financial and manpower resources needed for quarterly monitoring at the 11 new wells (installed under the WARP) and for the 25 existing monitoring wells in the Industrial Area.

- Assess data after one year (four sampling events) to determine continued monitoring needs.

- Provide periodic reports to the IM/IRA Project Manager about monitoring progress and data evaluation.

- Review and evaluate verification monitoring data via the DSS.

- Initiate and direct preprogrammed responses if COPC concentrations exceed action levels.

- Notify the IM/IRA Project Manager concerning the initiation of any preprogrammed responses.

Real-Time Radioactivity Monitoring Project Manager (Keith Motyl: 966-2172). The responsibilities of the RTRM Project Manager for IM/IRA activities are as follows:

- Manage the design, fabrication, testing, and installation of the RTRM prototype for surface-water monitoring.

- Communicate with the IM/IRA Project Manager on the progress and implementation of the RTRM system.

- Coordinate with the potential users from the Surface-Water Branch about installation, radiotelemetry, and overall feasibility of the technology to monitor surface water.

- Serve as primary DSS reviewer for the IM/IRA Program.

Surface Water Technical Support (Ian Paton: 966-2680). The responsibilities of the Surface Water Technical Support Manager are as follows:

- Serve as DSS reviewer.

- Perform technical consulting.

## 5.1 REFERENCES

U.S. Department of Energy. 1994 (September). *Proposed Interim Measures/Interim Remedial Actions Decision Document for the Rocky Flats Industrial Area.* Environmental Restoration Division. Golden, Colorado.

# 6.0 IMPLEMENTATION PLAN REPORTING AND REVISIONS

The IM/IRA Project will generate several types of reports. Internal reports will be developed to inform the IM/IRA Project Manager and DOE of the IM/IRA Project progress. The reports will include information about implementation of proposed actions for monitoring program enhancements and results from verification monitoring programs. External reports will include annual status reports to the regulatory agencies (EPA and CDPHE) on the progress of the Industrial Area IM/IRA Project activities. Communication will also be improved by holding internal and regulatory agency meetings at specific times or phases of the IM/IRA Project.

This IM/IRA/IP will be a dynamic document. It is expected that revisions to the document will be needed periodically because of changes in technical approaches, upgrades based on "lessons learned," or changes in the IM/IRA management or technical support team. Because this IM/IRA/IP is a controlled document, the IM/IRA Project Manager will make revisions in accordance with established QA guidelines.

## 6.1 INTERNAL IMPLEMENTATION PLAN: MEETINGS AND REPORTING REQUIREMENTS

Communication is an important component of the Industrial Area IM/IRA Project, because the technical support will be provided by various organizations within EG&G. Formalized communication (not daily routine communication) among the IM/IRA Project Manager, DOE, and the technical support team will include meetings and status reports. The internal meetings and reports for the IM/IRA Project are as follows:

- Monthly Status Reports. Monthly status reports will be developed by each technical support focal point to include (1) the past month's progress, (2) the current status, (3) expected progress and activities for the next month, (4) the schedule status, and (5) current or anticipated problems.

- Quarterly Status Reports for DOE. Quarterly status reports for DOE will be developed by the IM/IRA Project Manager to update the DOE Industrial Area Manager on the progress and status of the IM/IRA Project.

- Lessons Learned Report. A lessons-learned report will be developed by the IM/IRA Project Manager along with the technical support team at the conclusion of a transition activity verification monitoring project. This report will describe the successes and failures of the project and will specify corrective actions to improve monitoring or activity performance.

- Transition Verification Monitoring Meetings. The IM/IRA Project Manager will hold meetings with the technical support team during the initial phases of the verification monitoring program. These meetings will allow problems to be discussed and solved in an expeditious manner. The meeting frequency is at the discretion of the Project Manager. At a minimum, monthly meetings will be held. A meeting summary will be written and distributed to the team describing discussions and action items.

- Verification Monitoring Kick-Off Meeting. When a transition activity is scheduled that requires verification monitoring, the IM/IRA Project Manager will schedule a kick-off meeting. This meeting will be held to discuss the scope of the transition activity, the level of verification monitoring needed, reporting requirements, responsibilities, and data reporting coordination. The IM/IRA Project Manager will write a meeting summary.

- Transition Activity Meetings. The IM/IRA Project Manager will attend transition activity meetings that could directly affect the scheduling, implementation, coordination, and performance of verification monitoring activities.

## 6.2 REGULATORY AGENCY IMPLEMENTATION PLAN: MEETINGS AND REPORTING REQUIREMENTS

The IM/IRA/DD (DOE 1994) specifies that DOE will produce an annual report and transmit it to EPA and CDPHE before the annual project status meeting. The annual report must be submitted in the first quarter of the fiscal year based on the anniversary date of the regulatory agency's acceptance of the IM/IRA/DD (December 1994). The IM/IRA Project Manager will aid the DOE Industrial Area Manager in developing the annual report. The components of the report will include (but not be limited to) the following:

- progress and current status on program enhancements to the Industrial Area's environmental monitoring systems;
- verification monitoring activities for the past 12 months, including the following:
  - type of transition activities;
  - building or site name;
  - COPCs;
  - verification monitoring level or locations;
  - action levels;
  - response actions (if any);
  - verification monitoring results summary;
  - problems and corrective actions;
- planned activities for the next 12 months; and
- schedule update for future transition activities.

At the completion of a verification monitoring program, the DOE Industrial Area Manager (with the help of the IM/IRA Project Manager) will transmit to EPA and CDPHE a verification monitoring summary report. This report will summarize the verification monitoring project activities, actions, monitoring locations, and final results.

### 6.3 IMPLEMENTATION PLAN REVISIONS

This IM/IRA/IP is considered a controlled document. A controlled document is an active policy, procedure, practice, instruction or design document maintained by the organization with programmatic responsibility and made available for centralized control, distribution and disposition in accordance with applicable standards.

The Environmental Restoration Program Division's (ERPD) *Preparation and Use of Document Modification Requests* (EG&G 1994) contains the specific procedures necessary to modify a controlled document. This publication establishes a modification process to ensure that new procedures, documents, and revisions are created, revised, canceled, or changed consistent with internal procedures. These procedures are applicable to all ERPD personnel. The situations that require a DMR include the following:

- editorial changes;
- nonintent changes;
- intent changes;
- work plan intent changes based on technical memoranda;
- document development or revision; and
- document cancellation.

The above-referenced document contains a step-by-step DMR procedure in Section 6 (Instruction Section). It is the IM/IRA Project Manager's responsibility to initiate DMRs, whenever applicable, according to this QA guideline.

## 6.4 REFERENCES

EG&G Rocky Flats, Inc. 1994. *Preparation and Use of Document Modification Requests*. 2-E04-ER-ADM-05.07, Revision 2, Golden, Colorado.

U.S. Department of Energy. 1994 (September). *Proposed Interim Measures/Interim Remedial Actions Decision Document for the Rocky Flats Industrial Area.* Environmental Restoration Division. Golden, Colorado.

APPENDIX A

Draft 1995 Well Abandonment and Replacement
Program Work Plan
(Sections 1 and 2)

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# WELL ABANDONMENT & REPLACEMENT PROGRAM WORK PLAN FY95

**Draft Final**

U.S. DEPARTMENT OF ENERGY
Rocky Flats Environmental Technology Site
Golden, Colorado

ENVIRONMENTAL RESTORATION PROGRAM

APRIL 1995

In Compliance with DOE ORDER 5400.1

Document Control Number RF/ER-95-0013

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RF/ER-95-0013

# WELL ABANDONMENT AND REPLACEMENT PROGRAM WORK PLAN FY95

Approved By:

| | |
|---|---|
| Environmental Restoration<br>Environmental Operations Management<br>Operations Manager | Date |
| Project Manager | Date |
| Quality Assurance Coordinator | Date |

All other required concurrence and approvals on file.

(wpf) h:\wp\flats\warp\95wrkpln\approval 4/25/95

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## LIST OF ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| AAC | additional area of concern |
| ASME | American Society of Mechanical Engineers |
| BZ | Buffer Zone |
| CCR | Code of Colorado Regulations |
| CDPHE | Colorado Department of Public Health and Environment |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| CFR | Code of Federal Regulations |
| CLP | Contract Laboratory program |
| COC | chain-of-custody |
| DMR | Document Modification Request |
| DOE | U.S. Department of Energy |
| DOT | U.S. Department of Transportation |
| DQO | Data Quality Objective |
| EG&G | EG&G Rocky Flats, Inc. |
| EOM | Environmental Operations Management |
| EPA | U.S. Environmental Protection Agency |
| ERM | Environmental Restoration Management |
| ERPD | Environmental Restoration Program Division |
| FD | French Drain (OU1) |
| FID | flame ionization detector |
| FO | field operations |
| ft | feet |
| FY | Fiscal Year |
| GET | General Employee Training |
| GMP | Groundwater Monitoring Program |
| GRRASP | General Radiochemistry and Routine Analytical Service Protocol |
| GT | geotechnical |
| GW | groundwater |
| H&S | health and safety |
| HASP | Health and Safety Plan |
| HASPP | Health and Safety Program Plan |
| HSO | Health and Safety Officer |
| HSS | Health and Safety Specialist |
| IA | Industrial Area |
| IAG | Interagency Agreement |
| IDM | investigation-derived materials |
| IHSS | Individual Hazardous Substance Site |

## LIST OF ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| IM/IRA | Interim Measures/Interim Remedial Action |
| LHSU | lower hydrostratigraphic unit |
| Li | lithium |
| M&TE | measuring and testing equipment |
| NEPA | National Environmental Policy Act |
| $NO_3 + NO_4$ | nitrate plus nitrite |
| NSL | New Sanitary Landfill |
| OP | operating procedure |
| OPWL | Original Process Waste Line |
| OSHA | Occupational Safety and Health Administration |
| OU | Operable Unit |
| PA | Protected Area |
| PAC | Potential Areas of Concern |
| PCE | tetrachloroethene |
| PID | photo ionization detector |
| POD | plan of the day |
| PPE | personal protective equipment |
| PSL | Present Sanitary Landfill |
| PVC | polyvinyl chloride |
| QA | Quality Assurance |
| QAA | Quality Assurance Addendum |
| QAP | Quality Assurance Program |
| QAPjP | Quality Assurance Project Plan |
| QC | Quality Control |
| RCA | Radiological Control Area |
| RCRA | Resource Conservation and Recovery Act |
| RE | Radiological Engineering |
| RFEDS | Rocky Flats Environmental Database System |
| RFETS | Rock Flats Environmental Technology Site |
| RFFO | Rocky Flats Field Office |
| RFI/RI | RCRA Facility Investigation/Remedial Investigation |
| RR | readiness review |
| RWP | Radiation Work Permit |
| SEP | Solar Evaporation Ponds |
| Site | Rocky Flats Environmental Technology Site |
| $SO_4$ | sulfate |
| SOW | Statement of Work |
| TAL | Target Analyte List |
| TBD | To be Determined |

## LIST OF ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| TCE | trichloroethene |
| TCL | Target Compound List |
| TDS | total dissolved solids |
| U | uranium |
| UBC | under-building contamination |
| UHSU | upper hydrostratigraphic unit |
| VCR | video cassette recorder |
| VOA | volatile organic analysis |
| VOC | volatile organic compound |
| WARP | Well Abandonment and Replacement Program |
| WSRIC | Waste Stream and Residue Identification and Characterization |
| $\alpha$ | alpha |
| ß | beta |

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## EXECUTIVE SUMMARY

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The United States Department of Energy/Rocky Flats Field Office has initiated and is continuing the Well Abandonment and Replacement Program under the direction of the Environmental Restoration Program Division of EG&G Rocky Flats, Inc. This Work Plan describes the implementation of this maintenance project at the Rocky Flats Environmental Technology Site during fiscal year 1995. Under this project, selected wells will be maintained, abandoned, or replaced, depending on program needs. The planned scope of work is to perform maintenance at three wells, abandon 47 wells, and replace or install 28 new wells as additions to the Groundwater Monitoring Program and operable units at the site. In addition, an evaluation and compilation of the current groundwater monitoring well network will be included.

The Well Abandonment and Replacement Program ensures that groundwater monitoring wells and piezometers are viable and useable for groundwater protection. The project will eliminate and selectively replace wells and piezometers yielding groundwater quality or water level data that are suspected to be nonrepresentative of true subsurface conditions. All field activities will be performed in accordance with applicable Environmental Restoration Program Division Department Operating Procedures, quality assurance guidance, health and safety guidance, and program-specific plans.

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# 1.0 INTRODUCTION

The United States Department of Energy (DOE) Rocky Flats Environmental Technology Site (Site) initiated a Well Abandonment and Replacement Program (WARP) in 1992 under the direction of the Environmental Restoration Program Division (ERPD) of EG&G Rocky Flats, Inc. (EG&G). During Fiscal Year 1994 (FY 94), WARP abandoned 28 groundwater monitoring wells, installed 19 replacement groundwater monitoring wells, and implemented other maintenance activities at the site. The WARP also supports geotechnical, seismic, and well evaluation programs. Costs for the WARP project are tracked under Environmental Operations Management (EOM) Groundwater Protection Work Package No. 61203. This WARP Work Plan describes the implementation of the currently planned phase of the program in which selected wells, will be maintained, abandoned or replaced, and newly installed during FY 95 to meet the needs of groundwater protection through the requirements of DOE Order 5400.1 (*DOE Order 5400.1, General Environmental Protection Program* (U.S. DOE, 1988) as administered through the Groundwater Monitoring Program (*Groundwater Protection Monitoring Program Plan*, EG&G, 1994a) and the need for groundwater monitoring wells in several other sitewide locations.

## 1.1 STATEMENT OF SCOPE

The planned scope of work is to perform maintenance at three wells, abandon 47 wells by one of five abandonment methods, and install 28 new wells as additions to the Groundwater Monitoring Program (GMP) and investigations at the New Sanitary Landfill (NSL), Rocky Flats Industrial Area (IA) operable units (OUs) for the Interim Measures/Interim Remedial Action (IM/IRA), and OUs 1 and 7. In addition, two new well borings will be geophysically assessed for OU1. EG&G will determine the sequence and timing for well abandonment, installation, maintenance, and geophysical survey activities, and may alter the number of wells to be abandoned, installed, or geophysically surveyed. However, these changes should be minor and will include only



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abandonments and installations that cannot be delayed because of potential harm to groundwater at the Site. Abandonment, installation, maintenance, and geophysical activities are detailed in Section 2.0.

The general schedule for implementation of this Work Plan is provided in the *Statement of Work for the 1995 Well Abandonment and Replacement Program, Rocky Flats Environmental Technology Site* (EG&G, 1995a), Figure 1.1-1. The detailed schedule addresses the time requirements for implementation of the Work Plan and deliverables from the contract award date. The schedule for the FY 95 WARP project consists of the following three phases.

1. Pre-field activities consist of award of subcontract, subcontractor training, approval of health and safety plan, approval of categorical exclusion, clarification of wetlands findings regarding migratory birds threatened and endangered species concerns, readiness review, and obtaining office and staging work space.

2. Field activities include mobilization of drilling crews, abandonment of Phase I wells, installation of wells in the IA, abandonment of Phase II wells, installation of wells at OU1, abandonment of wells at OU7, installation of sitewide wells, well maintenance activity, core logging, waste management, sample documentation, well surveying, and demobilization of drilling crews.

3. Post-field activities consist of writing the 1995 WARP Report draft, incorporation of review comments and submitting the final 1995 WARP Report, and preparing the WARP Geochemical Addendum Report.

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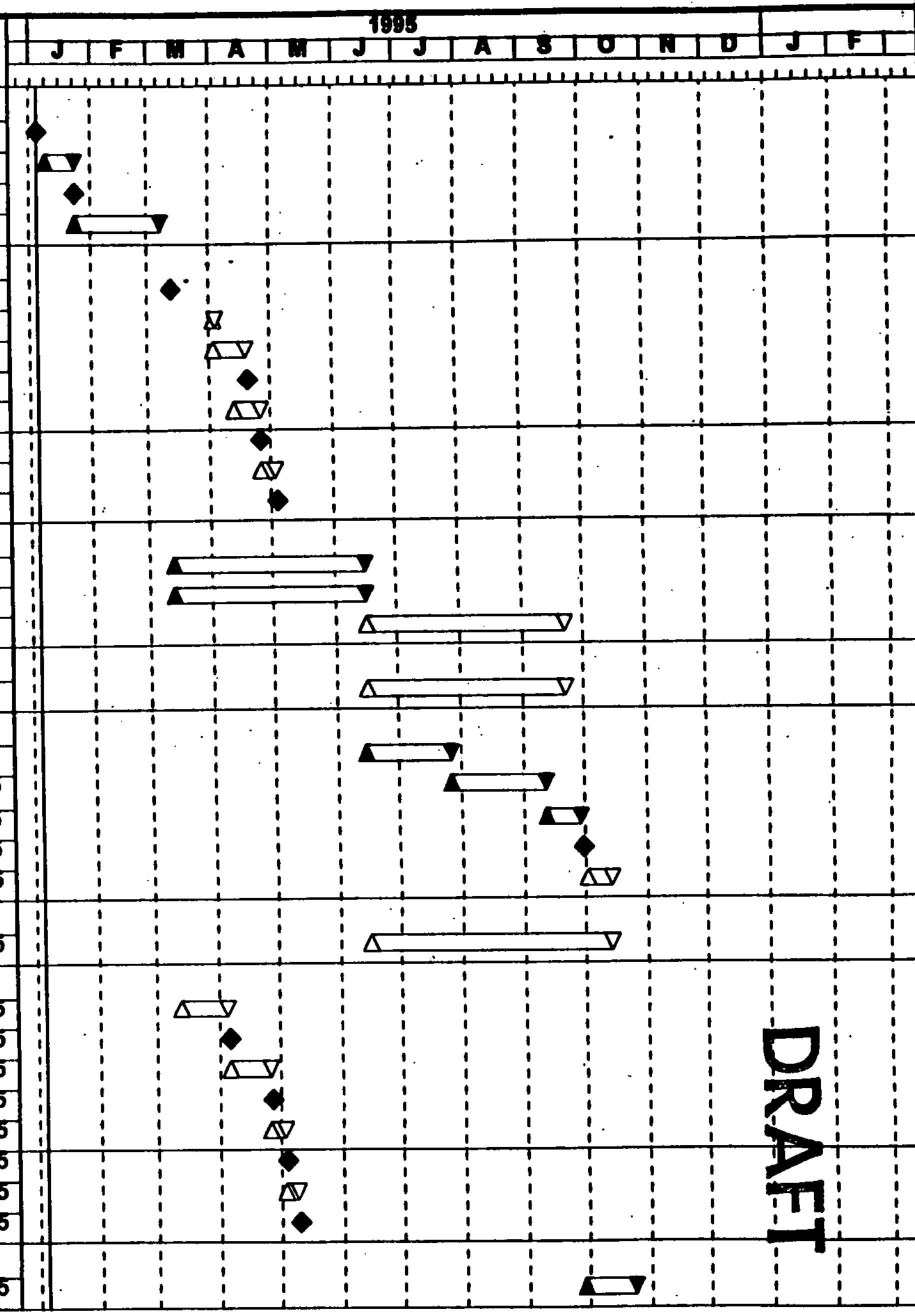
| Act ID | Activity Description | Orig Dur | Early start | Early Finish |
|---|---|---|---|---|
| **PROPOSAL PREPARATION** | | | | |
| PROP-005 | JEG Receive SOW | 0 | 05JAN95 | |
| PROP-010 | JEG Proposal Preparation | 11 | 09JAN95 | 23JAN95 |
| PROP-015 | JEG Deliver Proposal to EG&G | 0 | | 23JAN95 |
| PROP-020 | EG&G Review/Negotiation/Update Tables | 31 | 24JAN95 | 07MAR95 |
| **1995 WORK PLAN** | | | | |
| 401-005 | EG&G Award Subcontract to JEG | 0 | 13MAR95 | |
| 401-010 | EG&G/JEG Interactive Schedule Mtg/Client Kickoff | 1 | 03APR95 | 03APR95 |
| 401-015 | JEG Develops Task Schedule for EG&G | 12 | 03APR95 | 18APR95 |
| 401-020 | JEG Delivers Task Schedule to EG&G | 0 | | 19APR95 |
| 401-025 | JEG Assists EG&G in WARP Work Plan | 9 | 13APR95 | 25APR95 |
| 401-030 | JEG Delivers Final WARP Work Plan to EG&G | 0 | | 25APR95 |
| 401-035 | EG&G Reviews Final WARP Work Plan | 5 | 26APR95 | 02MAY95 |
| 401-040 | EG&G Provides Approval of Work Plan to JEG | 0 | | 03MAY95 |
| **WELL MAINTENANCE** | | | | |
| 402-005 | JEG Procures Equipment/Materials/Subs | 68 | 13MAR95 | 15JUN95 |
| 402-010 | JEG Site Preparation/Coordination/Training | 68 | 13MAR95 | 15JUN95 |
| 402-015 | JEG Perform Well Maintenance | 68 | 16JUN95 | 21SEP95 |
| **WELL ABANDONMENT** | | | | |
| 403-015 | JEG Perform Well Abandonment | 68 | 16JUN95 | 21SEP95 |
| **WELL REPLACEMENT** | | | | |
| 404-010 | JEG Perform Well Replacement I.A. (1-11) | 29 | 15JUN95 | 26JUL95 |
| 404-015 | JEG Perform Well Replacement GMP (12-23) | 32 | 27JUL95 | 11SEP95 |
| 404-020 | JEG Perform Well Replacement OU1 (24-28) | 13 | 12SEP95 | 28SEP95 |
| 404-025 | JEG Completes Field Activities | 0 | | 29SEP95 |
| 404-030 | JEG Field Close Out Activities | 10 | 02OCT95 | 13OCT95 |
| **DATA MANAGEMENT** | | | | |
| 406-005 | JEG Data Management | 84 | 16JUN95 | 13OCT95 |
| **HEALTH & SAFETY PLAN** | | | | |
| 407-005 | JEG Develops Draft H&S Plan | 17 | 13MAR95 | 04APR95 |
| 407-010 | JEG Delivers Draft H&S Plan to EG&G | 0 | | 05APR95 |
| 407-015 | EG&G Reviews Draft H&S Plan | 14 | 06APR95 | 25APR95 |
| 407-020 | JEG Receives EG&G Comments | 0 | | 26APR95 |
| 407-025 | JEG/EG&G Resolve Comments/Develop Final | 5 | 26APR95 | 02MAY95 |
| 407-030 | JEG Delivers Final H&S Plan to EG&G | 0 | | 03MAY95 |
| 407-035 | EG&G Reviews Final H&S Plan | 4 | 03MAY95 | 08MAY95 |
| 407-040 | EG&G Provides H&S Plan Approval to JEG | 0 | | 09MAY95 |
| **WARP REPORT** | | | | |
| 408-005 | JEG Develops Draft WARP Report | 17 | 29SEP95 | 23OCT95 |




Project Start 05JAN95
Project Finish 29FEB96
Data Date 05JAN95
Plot Date 20APR95
(c) Primavera Systems, Inc.

Early Bar
Progress Bar
Critical Activity

9001

Sheet 1 of 2

WARP 1995
WORK PLAN SCHEDULE
FIGURE 1.1-1

JE JACOBS ENGINEERING GROUP, INC.

| Date | Revision | Checked | Approved |
|---|---|---|---|

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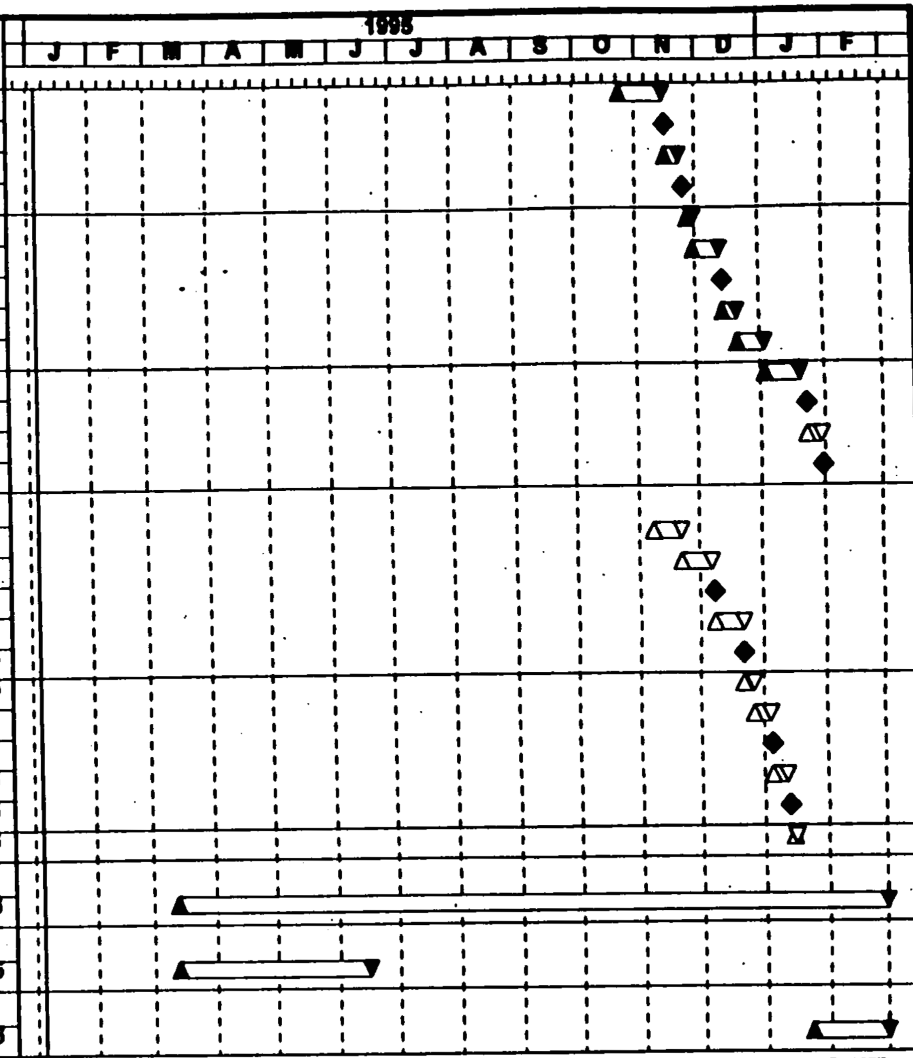
| Act ID | Activity Description | Orig Dur | Early start | Early Finish |
|---|---|---|---|---|
| 408-010 | JEG Senior Tech Review/Tech Edit/QC Draft Report | 16 | 24OCT95 | 14NOV95 |
| 408-015 | JEG Delivers Draft WARP Report to EG&G | 0 | | 15NOV95 |
| 408-020 | EG&G Reviews Draft WARP Report | 5 | 16NOV95 | 22NOV95 |
| 408-025 | JEG Receives Comments from EG&G | 0 | | 24NOV95 |
| 408-030 | JEG Reviews/Incorporate Comments | 3 | 27NOV95 | 29NOV95 |
| 408-035 | JEG Senior Tech Review/Tech Edit/QC Draft Final | 9 | 30NOV95 | 12DEC95 |
| 408-040 | JEG Delivers Draft Final WARP Report to EG&G | 0 | | 13DEC95 |
| 408-045 | EG&G Reviews Draft Final | 5 | 14DEC95 | 20DEC95 |
| 408-050 | JEG Reviews/Incorporate Comments/Develop RS | 7 | 21DEC95 | 02JAN96 |
| 408-055 | JEG Senior Tech Review/Tech Edit/QC Final Report | 13 | 03JAN96 | 19JAN96 |
| 408-060 | JEG Delivers Final WARP Report to EG&G | 0 | | 22JAN96 |
| 408-065 | EG&G Reviews Final WARP Report | 5 | 23JAN96 | 29JAN96 |
| 408-070 | JEG Receives Apprvl of Fnl WARP Report from EG&G | 0 | | 30JAN96 |
| **GEOCHEMICAL REPORT** | | | | |
| 409-005 | JEG Develops Draft Geochemical Report | 10 | 08NOV95 | 21NOV95 |
| 409-010 | JEG Senior Tech Review/Tech Edit/QC | 10 | 22NOV95 | 06DEC95 |
| 409-015 | JEG Delivers Draft Geochemical Report to EG&G | 0 | | 07DEC95 |
| 409-020 | EG&G Reviews Draft Geochemical Report | 10 | 08DEC95 | 21DEC95 |
| 409-025 | JEG Receives EG&G Comments | 0 | | 21DEC95 |
| 409-030 | JEG Reviews/Incorporate Comments/Develop RS | 2 | 22DEC95 | 26DEC95 |
| 409-035 | JEG Senior Tech Review/Tech Edit/QC Final Report | 5 | 27DEC95 | 03JAN96 |
| 409-040 | JEG Delivers Final Geochemical Report to EG&G | 0 | | 04JAN96 |
| 409-045 | EG&G Review of Final Geochemical Report | 5 | 05JAN96 | 11JAN96 |
| 409-050 | JEG Receives Approval of Final Report from EG&G | 0 | | 12JAN96 |
| 409-055 | Incorporate Geochemical Report in WARP Report | 1 | 15JAN96 | 15JAN96 |
| **PROJECT MANAGEMENT** | | | | |
| 410-005 | Project Management | 248* | 13MAR95 | 29FEB96 |
| **TRAINING** | | | | |
| 411-005 | Training | 68 | 13MAR95 | 15JUN95 |
| **PROJECT CLOSEOUT** | | | | |
| 412-005 | Project Closeout/End of Period of Performance | 28 | 23JAN96 | 29FEB96 |

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| | |
|---|---|
| Project Start | 05JAN95 |
| Project Finish | 29FEB96 |
| Data Date | 05JAN95 |
| Plot Date | 20APR95 |

Early Bar
Progress Bar
Critical Activity

(c) Primavera Systems, Inc.

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Sheet 2 of 2

**WARP 1995**
**WORK PLAN SCHEDULE**
**FIGURE 1.1-1**

| Date | Revision | Checked | Approved |
|---|---|---|---|

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The subcontractor shall prepare and submit a bid package to address fieldwork necessary to complete well abandonment, installation, and maintenance, and geophysical assessment and to provide the required documentation of the field activities. These activities will be performed in compliance with ERPD operating procedures in the geotechnical, groundwater, and field operations areas, the *Rocky Flats Site-Wide Quality Assurance Project Plan for CERCLA Remedial Investigations/Feasibility Studies and RCRA Facility Investigations/Corrective Measures Studies Activities* (QAPjP) (EG&G, 1994b), and the Site *Environmental Restoration Health and Safety Program Plan and Workbook Environmental Restoration Program, Rocky Flats Plant, U.S. Department of Energy, Golden, Colorado* (HASPP) (EG&G, 1990a). In addition, WARP shall be implemented under a task-specific Health and Safety Plan (HASP) that shall be prepared by the subcontractor.

The purpose of the Work Plan is to identify and describe the scope of the field activities in WARP for FY 95. These field activities include (1) abandonment of wells that are no longer necessary or viable, (2) installation of wells as additions to the GMP or needed by the OUs and replacement of nonviable wells from which there is still a need to collect groundwater monitoring data, (3) geophysical assessment of borings for special purpose needs, and (4) collection of subsurface soil and bedrock samples during the drilling of new and replacement wells. These samples may be used to generate analytical data for use by other ERPD projects to assist in determining the presence and extent of contamination to subsurface geologic materials. Requirements and controls for analyses of soil and rock samples are addressed in OU-specific Work Plans where data may be used to assist in determining the presence and extent of contamination.

The collection of groundwater samples and determination of contained constituents from the newly installed wells is not the WARP project purpose. The various programs requesting the wells will determine the frequency, specific analytes, and hydrologic information needed.

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## 1.2 OBJECTIVES

WARP is a maintenance program for the GMP at the Site. Implementation of WARP ensures the viability of groundwater monitoring wells and piezometers to collect representative samples of groundwater and other groundwater parameters. WARP provides a means to eliminate and selectively replace wells and piezometers where sample and water-level readings are suspected of not being representative of subsurface conditions. The general objectives of well abandonment include the following:

- prevention of groundwater and soil contamination through the well;
- prevention of intermixing of subsurface water through the well;
- conservation of hydraulic characteristics of hydrogeologic units; and
- minimization of physical hazards.

The specific objectives of WARP for FY 95 are to meet the following goals:

- Properly abandon 20 nonviable wells/piezometers using procedures that protect groundwater from contamination.
- Properly abandon 27 wells no longer required at the Present Sanitary Landfill (PSL) to prepare for closure construction.
- Install 27 new wells for the GMP, IA OUs, and OU1 at locations where sample or piezometric data is needed.
- Install one replacement well at the NSL where a previously nonviable well was removed.
- Assess three existing wells with questionable casing or well screen conditions using a downhole video camera.
- Geophysically log two deep borings at OU1 to identify the possible presence of a sitewide lithologic horizon useful in identifying potential bedrock faults.

## 1.3 PROPOSED WELL ABANDONMENTS, INSTALLATIONS, MAINTENANCE, AND GEOPHYSICAL ASSESSMENTS

The following sections summarize the scope of the proposed well abandonments, new and replacement well installations, well maintenance, and geophysical assessments for WARP in FY 95.

### 1.3.1 Well Abandonments

During FY 95 the WARP project proposes to abandon 47 groundwater monitoring wells at the PSL, upper North Walnut Creek Basin and Protected Area (PA). The location of the wells planned for abandonment are shown on Plate 1. Additional work to be determined (TBD) may include up to five other well abandonments. The criteria used to identify wells for abandonment include viability and usefulness to the GMP. A well is classified as *viable* only if its construction details meet minimum acceptable levels of documentation and meet requirements that ensure integrity of the well. A well is classified as *useful* only if the information obtained from it is necessary for meeting goals of the GMP or other current or future programs at the Site. Specific criteria for viability and usefulness are used in well evaluation and are found in the *Rocky Flats Plant Well Abandonment/Replacement Program Plan* (EG&G, 1990b).

In 1974[1] wells were installed in the upper Walnut Creek Basin to serve groundwater monitoring needs of the Solar Evaporation Ponds (SEP). These 18 wells were evaluated in the FY 94 WARP project *1994 Well Abandonment and Replacement Program Report*, (EG&G, 1995b). The 1994 work determined these wells to lack sufficient construction records and have improper construction (absence of locking cap and protective casing, lacking concrete surface pad and grout seal, lacking filter media and bentonite seal, and having abnormally wide [hand-cut] screen slots). During the 1994 evaluation two other

[1]At Rocky Flats the last two digits in the well number indicates the year of installation.

wells, installed possibly in 1988, were found to be of similar substandard construction.

Well abandonments proposed for these 20 nonviable wells within and north of the PA will be performed in two phases and are listed in Table 1.3.1-1 and shown on Plate 1. The first eleven wells of this group are to be abandoned in Phase 1. These will be followed by the next nine wells of the group which will be abandoned in Phase 2 after July 1, 1995.

**TABLE 1.3.1-1**
**Sitewide Nonviable Wells Proposed for Abandonment**

| Phase I | | Phase 2 | |
|---|---|---|---|
| **Well Number** | **Location** | **Well Number** | **Location** |
| 5074 | In PA near Solar Ponds | 5374 | North Walnut Creek |
| 5174 | In PA near Solar Ponds | 5474 | Northeast of PA |
| 5274 | In PA near Solar Ponds | 5874 | North Walnut Creek |
| 5574 | Northeast of PA | 5974 | Northeast of PA |
| 5674 | Northeast of PA | 6274 | North Walnut Creek |
| 5774 | Northeast of PA | 6374 | North Walnut Creek |
| 6074 | North Walnut Creek | 6474 | South of PSL |
| 6174 | North Walnut Creek | 6574 | South of PSL |
| 6774 | East of NSL | 6674 | South of PSl |
| 1288 | Central part of PA | | |
| 1388 | Central part of PA | | |



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Groundwater monitoring at the area of well 6674 will be met by the proposed replacement of new well 53195. Groundwater monitoring in the areas of wells 5875 and 5874 may be met by existing wells 1886 and 1586 respectively. Groundwater monitoring in the areas of wells 6374 and 6574 may be met by existing wells B208789 and 77392, respectively. Wells 5074, 5174, and 5274 are located in the SEP construction area and will not be replaced. The remaining 15 wells will not be replaced because they are in areas that have not been requested as needing groundwater monitoring to serve the OUs or the GMP.

The PSL, contained within the boundary of OU7, is to cease landfill operations in late 1995 when operations will be started at the NSL. At the PSL a landfill cap will be constructed as part of the closure requirements. Because of anticipated landfill cap construction and the termination of the need to continue Resource Conservation and Recovery Act (RCRA) groundwater monitoring, 27 wells have been deemed nonuseful and proposed for abandonment by OU7 as implemented through the FY 95 WARP project. Groundwater monitoring wells at the PSL proposed for abandonment were installed during 1986, 1987, 1989, and 1993 and are listed in Table 1.3.1-2.

**TABLE 1.3.1-2**
**Operable Unit 7 Nonuseful Wells Proposed for Abandonment**

| | | | |
|---|---|---|---|
| 0786 | 5887 | B106089 | 00393 |
| 0886 | 6087 | B206289 | 00493 |
| | 6187 | B206489 | 71193 |
| | 6287 | B206589 | 71493 |
| | 6487 | B206789 | 71693 |
| | 6587 | | 71893 |
| | 6687 | | 72093 |
| | 6887 | | 72293 |
| | 7087 | | 72393 |
| | 7287 | | 72493 |

### 1.3.2 Well Installations

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During FY 95 the WARP project proposes to install 28 groundwater monitoring wells. An additional six wells may be installed at locations to be determined. These wells will serve the needs of the GMP, IA OUs, NSL, and OU1. Locations of the wells proposed for installation are shown on Plate 1.

Two of the 28 wells are proposed to be completed in the lower hydrostratigraphic unit (LHSU) bedrock. These wells are proposed to examine lithology and possible fault offset in the bedrock.

The remaining 26 of the 28 wells proposed will be completed in the upper hydrostratigraphic unit (UHSU) which contains variable thicknesses of Rocky Flats Alluvium and a limited underlying thickness of weathered bedrock. Groundwater elevations may fluctuate seasonally and the level of saturation of the UHSU may vary depending upon locality. Maps based upon well water levels showing unsaturated areas at the Site and adjacent well hydrographs will be consulted for optimum well-site selection. In areas where surficial materials are possibly unsaturated, exploratory, driven well points will be used to determine if groundwater is available to meet groundwater sampling needs for chemical analysis. EG&G will provide equipment and staff for exploratory driven well points.

The areas of surficial contamination at the Site include Individual Hazardous Substance Sites (IHSSs) and all new well locations east of the IA potentially downwind of air-transported radionuclides. For wells proposed in these areas, a surficial contaminant control method will be implemented using an aseptic method. The method involves installing a 16-inch diameter steel surface casing to a depth of 2 feet and removing the potentially contaminated surficial material followed by installation of a concrete well pad. Remaining installation is similar to well construction at uncontaminated areas. Special aseptic techniques will be instituted based upon methodology developed under FY 94

WARP, where new well sites are located in surficial contamination areas (EG&G, 1995b).

Wells in areas not known to be contaminated at the surface will be installed using conventional casing installation methods. Typical well installation materials will use 2-inch diameter, schedule 40 polyvinyl chloride (PVC) riser and factory-cut well screen, and a 6-inch diameter steel protective surface casing with locking cap and padlock. Steel safety posts will be installed at each corner of the wellpad.

In traffic areas and where pavement exists at well sites, a pre-cut, 3-foot by 3-foot opening will be removed before drilling starts. Well casing caps will be flush mounted with locking cap; however, steel safety posts will not be used.

The FY 95 WARP project proposes to install 28 wells to meet the needs of four programs for groundwater monitoring in four areas at Rocky Flats.

Under the GMP 11 new wells are proposed to meet recommendations provided in the *1994 Well Evaluation Report*, (EG&G, 1994c). These well locations are based upon the groundwater modeling task results that have projected excursion trends of composited contaminants. These proposed wells are for downgradient groundwater monitoring coverage in the predicted flow pathways for contaminants. These contaminants have been grouped in three contaminant plume groups, (1) total dissolved solids (TDS), sulfate ($SO_4$), nitrite plus nitrate ($NO_3+NO_4$), (2) trichloroethene (TCE), tetrachloroethene (PCE), volatile organic compounds (VOCs), and (3) gross alpha (gross $\alpha$), gross beta (gross $\beta$), uranium (U), lithium (Li). Based upon groundwater modeling these contaminants may advance beyond known composite contaminant extent boundaries over the next 10 years. Because proactive tracking of these contaminants benefits groundwater protection at the Site, 13 groundwater monitoring well sites were recommended in the

Report. Wells 10694 and 10794 have been installed at the first two locations during FY 94 WARP. The 11 wells remaining are located in the southeastern part of the PA and in the east-central part of the Buffer Zone (BZ). These proposed wells have been assigned well numbers (location codes) from 53195 through and including 54195.

In the IA 11 new wells are proposed as specified in the *Final Interim Measures/Interim Remedial Action Decision Document for the Rocky Flats Industrial Area*, (U.S. DOE, 1994). These wells will provide a hydrologic basis for understanding potential contaminant sources such as under-building contamination (UBC) and original process waste lines (OPWL), detecting constituents, and determining their potential migration in the UHSU, thereby providing early detection of releases. These proposed wells have been assigned well numbers (location codes) from 54295 through and including 55295.

At the NSL one new well will be installed to replace a previously abandoned well. This well is needed to provide continuity for background groundwater characterization to maintain commitments with the Colorado Department of Public Health and Environment (CDPHE) for landfill monitoring. Wells at the NSL are sampled and measured for specific analytes at quarterly intervals throughout the year. Wells at this location provide groundwater samples to meet defined RCRA requirements for the NSL. Because of area-specific analytes and sampling frequency, the GMP has designated six well classes at the Site. This replacement well will join the well class designated *New Sanitary Landfill*. This well has been assigned the well number (location code) 55395.

At OU1 groundwater monitoring is part of the approach to predict contaminant migration patterns as presented in the *Final Corrective Measures Study/Feasibility Study, Rocky Flats Environmental Technology Site 881 Hillside Area (Operable Unit No. 1)* (U.S. DOE, 1995). Groundwater monitoring wells are proposed to assist with performance monitoring to comply with RCRA regulations. The draft *Recommended Additional Monitoring Well Locations for Evaluating Performance of the French Drain at Operable Unit 1*, (Dames & Moore, 1995) proposes two groundwater monitoring well cluster locations, totaling 5 wells at the OU1 French Drain. Wells at these proposed locations will help to evaluate the degree of interception of the alluvial groundwater by the French Drain and a possible fault based upon three wells upgradient in the UHSU. The second well cluster, consisting of two wells, is proposed for a downgradient location. The WARP project has been requested to install these 5 proposed wells. The proposed wells have been assigned well numbers (location codes) 55495 through and including 55895.

The siting rationale for the 28 proposed wells is presented in Table 1.3.2-1 and includes wells 53195 through 56895.

**TABLE 1.3.2-1**
**Siting Rationale for**
**Proposed Groundwater Monitoring Wells for FY 95 WARP**

| Proposed Well No. | Area of Installation | Projected depth (ft) | Zone of Well Completion | Siting Rationale for Proposed Well |
|---|---|---|---|---|
| 53195 | South of PSL | 19 | Alluvium | Downgradient monitoring of TCE, PCE, VOC plumes and TDS, $SO_4$, $NO_3+NO_4$ plumes |
| 53295 | North of well 3986 | 25 | Alluvium | Downgradient monitoring for TDS, $SO_4$, $NO_3+NO_4$ plumes |
| 53395 | South of Pond B-5 | 12 | Alluvium | Downgradient monitoring of well 13391 for TDS, $SO_4$, $NO_3+NO_4$ plumes |
| 53495 | East of Bldg 990 | 20 | Alluvium | Downgradient monitoring TCE, PCE, VOC plumes |
| 53595 | South of East Access Road | 28 | Alluvium | Downgradient monitoring of TCE, PCE, VOC plumes and TDS, $SO_4$, $NO_3+NO_4$ plumes |
| 53695 | Southeast corner of PA | 13 | Alluvium | Downgradient monitoring for TCE, PCE, VOC plumes |
| 53795 | Southeast part of PA | 10 | Alluvium | Downgradient monitoring for TCE, PCE, VOC plumes |
| 53895 | North of Pond C-2 | 19 | Alluvium | Downgradient monitoring for TCE, PCE, VOC plumes and TDS, $SO_4$, $NO_3+NO_4$ plumes |
| 53995 | Southeast of IA | 21 | Alluvium | Downgradient monitoring for gross $\alpha$, gross $\beta$, U, Li plumes and TCE, PCE, VOC plumes |
| 54095 | Southeast of IA | 12 | Alluvium | Downgradient monitoring for TCE, PCE, VOC plumes |

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## TABLE 1.3.2-1
## Siting Rationale for
## Proposed Groundwater Monitoring Wells for FY 95 WARP

| Proposed Well No. | Area of Installation | Projected depth (ft) | Zone of Well Completion | Siting Rationale for Proposed Well |
|---|---|---|---|---|
| 54195 | North of Woman Creek | 12 | Alluvium | Downgradient monitoring TCE, PCE, VOC plumes; TDS, $SO_4$, $NO_3$+$NO_4$ plumes; and gross α, gross ß, U, Li plumes |
| 54295 | North of Bldg 371 | 12 | Alluvium | Downgradient monitoring of Bldg 371, documented UBC, IHSSs 151 and 212 |
| 54395 | Northwest of Bldg 556 | 12 | Alluvium | Downgradient monitoring of Bldg 556, chemical storage in Bldg 559 with documented UBC |
| 54495 | Southeast of Bldg 371/374 | 33 | Alluvium | Downgradient monitoring for VOCs from well P114889, elevated VOCs and radionuclides in downgradient wells P114789 and P114689, near IHSSs 156.1, 186, 188 |
| 54595 | Southeast of Bldg 559 | 11 | Alluvium | Downgradient monitoring east of Bldg 559, elevated VOAs in well P114689, near IHSS 159 |
| 54695 | North of Bldg 776/777 | 11 | Alluvium | Downgradient monitoring for Bldg 776/777 in area of IHSSs 118.1, 131, 132, 144, potential UBC; VOCs and radiochemicals in wells P209389 and P209289 |
| 54795 | North of Bldg 771 | 23 | Alluvium | Downgradient monitoring for UBC at Bldg 771 which stores chemicals, near IHSSs 126.1 126.2, and downgradient of IHSSs 118.1, 131, 132, 144 |
| 54895 | West of Bldg 750 | 10 | Alluvium | Downgradient monitoring of OPWL, downgradient east of Bldg 707, radionuclides in well P218089 |
| 54995 | East of Bldg T886A | 10 | Alluvium | Downgradient monitoring of Bldg 865, 886; well P317989 detected radiochemicals |
| 55095 | East of Bldg 444 | 26 | Alluvium | Downgradient monitoring of Bldg 444 and IHSS 136.2, 207 |
| 55195 | Northeast of Bldg 371/374 | 33 | Alluvium | Downgradient monitoring of Bldg 371 UBC, near IHSSs 151, 212 55295 |
| 55295 | East of Bldg 371/374 | 33 | Alluvium | Downgradient monitoring of Bldg 371 UBC, near IHSSs 151, 212 |

**TABLE 1.3.2-1**
**Siting Rationale for**
**Proposed Groundwater Monitoring Wells for FY 95 WARP**

| Proposed Well No. | Area of Installation | Projected depth (ft) | Zone of Well Completion | Siting Rationale for Proposed Well |
|---|---|---|---|---|
| 55395 | East side of NSL | 72 | Alluvium | NSL Downgradient monitoring/ characterization to replace well 0490 |
| 55495 | North of OU1 FD | 50 | Top Bedrock | Monitoring for potential bypass under FD |
| 55595 | North of OU1 FD | 200 | Deep Bedrock | Monitoring for groundwater contaminants in potential 025° fault |
| 55695 | North of OU1 FD | 50 | Top Bedrock | Monitoring for potential bypass in weathered bedrock |
| 55795 | South of OU1 FD | 15 | Alluvium | Monitoring for groundwater bypassing FD |
| 55895 | South of OU1 FD | 150 | Deep Bedrock | Monitoring for groundwater contaminants in potential 025° fault |

Notes:

FD = French drain
ft = feet
gross $\alpha$ = gross alpha
gross $\beta$ = gross beta
IA = Industrial Area
IHSS = Individual Hazardous Substance Site
Li = lithium
$NO_3 + NO_4$ = nitrate plus nitrite
NSL = New Sanitary Landfill
OPWL = Original Process Waste Line
OU = operable unit
PCE = tetrachloroethene
PSL = Present Sanitary Landfill
$SO_4$ = sulfate
TCE = trichloroethene
TDS = total dissolved solids
U = uranium
UBC = under-building contamination
VOA = volatile organic analysis
VOC = volatile organic compound

Proposed wells 53195 through 54195 will meet requests of the GMP.
Proposed wells 54295 through 55295 will meet requests of the IA OUs.
Proposed well 55395 will meet requests for the NSL.
Proposed wells 55495 through 55895 will meet requests of OU1.

### 1.3.3 Well Maintenance

Video camera inspection will be used at wells that have been inaccessible to sampling devices. These include wells P114589, west of the PA, and wells 72093 and 72393, located at the PSL. Obstructions in the wells may affect sampling ability and limit future well-abandonment-method options proposed for the two 1993 wells. Well riser and protective surface casing extensions, if needed, will be installed for existing well locations at the PSL, which will have ground surface elevation additions. As added protection, 5-foot sections of 24-inch diameter, precast concrete culvert pipe, or equivalent, will be installed before the extension of well riser and casing. In addition, well maintenance will be performed at three other TBD locations.

### 1.3.4 Geophysical Assessments

Geophysical borehole logging is proposed for two deep wells at the OU1 French Drain for the examination of the "A Marker" claystone in the bedrock as described in the *Geologic Characterization Report for the Rocky Flats Environmental Technology Site* (EG&G, 1995c). This lithologic marker is expected at approximately 140 to 190 feet below ground surface and its location may be useful in determining structural offset at a potential fault.

Additional geophysical borehole logging is an option for boreholes TBD under the Systematic Evaluation Program. Continuity of the program is currently under review. Work during the FY 94 WARP involved geophysical borehole evaluation.

## 1.4 PROJECT STAFFING AND RESPONSIBILITIES

The FY 95 WARP project will be implemented by EG&G employees and subcontractors. Figure 1.4-1 shows the EG&G organization chart indicating the positions of authority regarding WARP management. Key project positions for WARP FY 95 and responsibilities are explained in the following sections and shown in Figure 1.4-1.

### 1.4.1 EG&G Project Positions

The following are project positions required for the performance of the FY 95 WARP.

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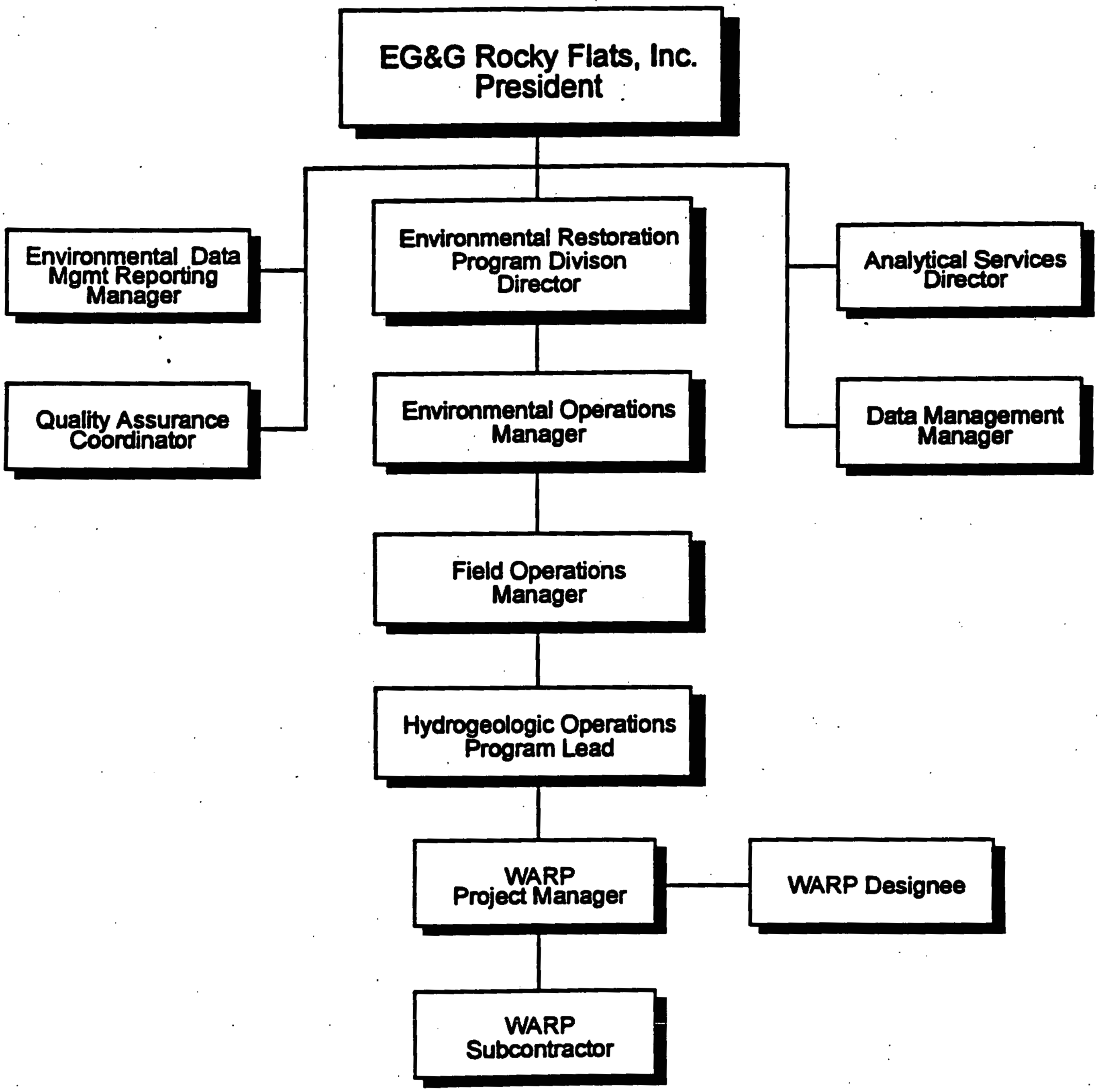
# FIGURE 1.4-1
# EG&G Rocky Flats, Inc.
# Management Organization



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#### 1.4.1.1 Project Manager

The project manager is the primary interface between the subcontractor and EG&G and DOE. The project manager communicates with the subcontractor project manager or the project manager designee as required, and provides overall project direction from EG&G and DOE.

#### 1.4.1.2 Hydrogeologic Operations Program Lead

The program lead advises the project manager regarding WARP project needs and schedules to conform to groundwater protection requirements. The program lead reviews the WARP project and provides status summaries to the field operations manager.

#### 1.4.1.3 Field Operations Manager

The field operations manager provides WARP project summaries to the operations manager regarding accomplishments, information, problems, and applied solutions.

#### 1.4.1.4 Operations Manager

The operations manager provides WARP project assessment reports to the ERPD director.

### 1.4.2 Subcontractor Project Positions

The following are subcontractor project positions required for the performance of the FY 95 WARP.

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#### 1.4.2.1 Program Manager

The program manager is responsible for acquiring technical resources and monitoring project budgets and schedules. The program manger will provide monthly documents for project cost-tracking purposes.

#### 1.4.2.2 Project Manager

The project manager is responsible for coordinating project activities, providing managerial and technical support to meet schedules, and allocates the staffing resources to manage the project. The project manager is the point of contact for the EG&G project manager concerning project scope, technical direction, schedule, and budget. The project manager provides periodic WARP activities updates and weekly highlights.

#### 1.4.2.3 Quality Assurance (QA) Officer

The QA officer evaluates the project tasks for quality requirements in compliance with the QAPjP and standards of professional practice. The QA officer approves all documents addressing quality parameters, conducts orientations, and performs reviews and audits of field activities, project records, and other functions that potentially affect project quality.

#### 1.4.2.4 Health and Safety Officer (HSO)

The HSO provides oversight and direction and performs audits to ensure adherence to the health and safety (H&S) requirements of the site HASPP, the task-specific HASP, and professional standards of practice.

#### 1.4.2.5 Health and Safety Specialist (HSS)

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The HSS provides monitoring services for hazardous, chemical, and radiological contaminants in the work area. Certain minimum qualifications and training requirements must be met before an IHSS shall be authorized to perform monitoring services. HSSs must be certified by Radiological Engineering (RE) and Industrial Hygiene in accordance with relative and appropriate standards.

#### 1.4.2.6 Field Supervisor

The field supervisor is responsible for supervising the project field activities of the site geologists. The field supervisor will be the primary contact for matters of routine project field operations and will interface with the EG&G project manager or the project manager designee on operational and technical decisions requiring EG&G or DOE input. The field supervisor will keep EG&G apprised of project progress on a day-to-day basis.

#### 1.4.2.7 Site Geologist

A site geologist will supervise lower-tier subcontractor drilling crews and conduct project field operations on a day-to-day basis. The site geologist will be responsible for compliance with the requirements of this Work Plan and other applicable project documents, including completion of all field forms. The site geologist will conduct a variety of support tasks to ensure that facilities, equipment, supplies, vehicles, and records are of high quality for job performance.

#### 1.4.2.8 Field Technician

A field technician will assist the site geologist during installation of wells and meet the requirements of this Work Plan and other applicable project documents, including completion of all field forms. The field technician will also support soil sampling and sample management and assist with a variety of support tasks to ensure that facilities, equipment, supplies, vehicles, and records are of high quality for job performance.

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#### 1.4.2.9 Data Manager

A data manager will be responsible for entering data acquired in the field into the Rocky Flats Environmental Database System (RFEDS).

### 1.4.3 Required Training for Subcontractor

Field work on the FY 95 WARP project will require applicable training for the various subcontractor positions. The subcontractor will prepare a matrix of positions and minimum required training. Documentation of previous and new training must be approved, filed, and available for verification by EG&G Training and Qualification. A list of training courses, briefings, required readings, and indoctrinations that will be required depending upon project responsibilities is listed below:

- Occupational Safety and Health Administration (OSHA) 40-Hour Hazardous Materials/Emergency Response Training
- 3- or 1-Day Hazardous Waste Operations On-The-Job Training
- Department of Transportation (DOT) Training
- Rad Worker Level I or II Training
- Respirator Indoctrination and Respirator Fit Test
- OSHA 8-Hour Refresher Training
- OSHA Supervisor Training
- Site-Specific Safety Briefing
- General Employee Training (GET) Subcontractor with Fire Protection Training
- Rocky Flats Environmental Technology Site (RFETS) Visitor Information Reading
- Hazard Communication Training

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- RCRA Hazardous Waste Training Checklist
- RCRA Computer-based Training
- QA Overview Training
- Environmental Restoration Management (ERM) QA Project Plan and RFETS Policy Required Reading
- Computer Security for Users Training
- Waste Generator Qualification Training
- Building Indoctrination
- Nuclear Materials Safeguards Training
- Buffer Zone Indoctrination
- Waste Determination & Waste Stream and Residue Identification and Characterization (WSRIC)
- Management of Soil and Sediment Investigation-Derived Materials (Including: How to Perform Data Analysis per FO.23)
- Disposition of Soil and Sediment Investigation-Derived Material
- Performance Checking and Operation of Ludlum Smear Counting Instruments
- Receiving, Marking, and Labeling Environmental Materials Containers
- Monitoring and Containerizing Drilling Fluids and Cuttings
- Evaluation of ERM Data for Usability in Final Reports
- Records Capture and Transmittal
- Records Identification, Preliminary Preparation, and Creation
- Decontamination of Equipment at Decontamination Facilities

## 1.5 WORK LOCATION AND SITE DESCRIPTION

Groundwater monitoring wells proposed for abandonment, replacement, maintenance, and geophysical surveys are located within the Site, which comprises approximately 6,550 acres in northern Jefferson County, Colorado. The Site is subdivided into three security zones. The major site structures, including all former production buildings, are within the 400-acre Site Security Zone (i.e., Controlled Area). Within the Controlled Area is the PA, which contains the most secure zone and former production areas. The Controlled Area is surrounded by a 6,150 acre BZ extending to the limits of the Site's property boundary.

The 47 wells proposed to be abandoned are shown on Plate 1. Of these, five wells are in the PA (one of which may be in a Radiological Controlled Area [RCA]), two are in the Controlled Area, and the other wells are in the BZ with 13 in the upper Walnut Creek drainage basin and 27 at the PSL in OU7.

Of the 28 wells to be installed, 12 are in the PA (Well 54695 may be in a RCA), two are in the Controlled Area, five are in the Woman Creek drainage basin, three are in the upper Walnut Creek drainage basin, one is near the NSL, and five are in the French Drain area of OU1. Access requirements and operating procedures vary widely between the Controlled Area and the Buffer Zone.

## 1.6 SITE CONDITIONS

The site is situated on an eastward-sloping alluvial surface deposited in the Quaternary period (approximately 900,000 years ago) covering the eastward-sloping Rocky Flats bedrock pediment. At the site, the alluvium and underlying pediment surface is dissected by a series of east-northeast trending stream-cut valleys. These valley drainages lie 50 to 200 feet below the level of the Rocky Flats bedrock pediment. Most bedrock is concealed beneath alluvium or colluvial and landslide material accumulated along the valley side slopes. Wells proposed for installation and abandonment located in valleys beyond the Controlled Area should be accessed by using established approved access roads and vehicles with all-terrain capabilities.

The geology of the site has been described in the Geologic Characterization Report (EG&G, 1995c) and in the *Phase II Geologic Characterization, Data Acquisition*

(EG&G, 1992). These reports provide detailed descriptions of the soils and rock units found in the subsurface at the site. In addition, boring logs exist for wells installed after 1986. These boring logs will be made available to the subcontractor for estimation of subsurface lithologies at the proposed new wells and well abandonments. The subsurface construction data are available for the wells to be abandoned at the PSL. Construction data for the 1974 and 1988(?) wells to be abandoned range from very limited to absent. Certain casing and completion information may be reviewed on the current Rocky Flats well list maintained by EG&G. Well 0886 at the PSL is completed in the bedrock within the LHSU to a total depth of 72 feet. All other wells to be abandoned have been completed in the UHSU and are not known to exceed 60 feet in depth. Two wells proposed at the French Drain for OU1 will be completed in deep bedrock of the uncontinued LHSU. All other new wells will be installed in the unconfined UHSU.

The groundwater conditions at the site have been described in three reports: *1994 Well Evaluation Report* (EG&G, 1994c), *1993 Well Evaluation Report* (EG&G, 1994d), and *Hydrogeologic Characterization Report* (EG&G, 1994e). Groundwater at the site exists under confined and unconfined conditions. Proposed activities for FY 95 WARP, in part, will occur in similar areas of the installations and abandonments as described in the 1994 WARP Report (EG&G, 1995b). This information may be useful to understand the background for comparably planned FY 95 WARP project activities.

Operations at the Site have generated nonhazardous, hazardous, radioactive, and mixed radioactive and hazardous waste. These types of wastes may be encountered in the subsurface.

# 2.0 WELL ABANDONMENT, INSTALLATION, AND GEOPHYSICAL PROCEDURES

The following sections address well abandonment, installation, and geophysical survey procedures; site access; reporting and documentation; permitting requirements; and field communications as they pertain to WARP. Activities under the FY 95 WARP project shall be conducted using operating procedures for field operations (FO), groundwater (GW), and geotechnical (GT) in accordance with *EG&G Environmental Restoration Program Division Volume I, Field Operations, Manual No. 5-21000-OPS-FO* (EG&G, 1995d), *EG&G Environmental Restoration Program Division Volume II, Groundwater, Manual No. 5-21000-OPS-GW* (EG&G, 1995e) and *EG&G Environmental Restoration Program Division Volume III, Geotechnical, Manual No. 5-21000-OPS-GT* (EG&G, 1995f), which are incorporated by reference into the FY 95 WARP Work Plan.

## 2.1 WELL ABANDONMENT

Instructions for well abandonment activities are described in GT.11, *Plugging and Abandonment of Wells*. The following sections address key elements of GT.11 and other relevant operating procedures as they apply to the WARP project. Environmental material handling and decontamination procedures pertaining to well abandonment activities are addressed in Sections 2.4 and 2.5.

### 2.1.1 Pre-Abandonment Activities

Pre-abandonment activities, including radiation screening and work site preparation, will be conducted at each abandonment site in accordance with the HASPP (EG&G, 1990a), the task-specific HASP (prepared by subcontractor), GT.10, *Borehole Clearing*, and FO.16, *Field Radiological Measurements*. In addition, the following pre-abandonment activities not specifically addressed in the operating procedures will be necessary:

- Measure and record groundwater-level and total depth of the well as directed in GT.05, *Plugging and Abandonment of Boreholes*, and in GW.01, *Water Level Measurements in Wells and Piezometers*.
- Determine the well diameter and calculate the volume of water contained within the well to ensure the construction of an amply sufficient waste liquid containment structure as described in GT.05, *Plugging and Abandonment of Wells*, Form GT.5A. Break up and remove the concrete well pad and remove the protective casing as specified in GT.11, *Plugging and Abandonment of Wells*.

### 2.1.2 Abandonment Methods

The decision on the appropriate well abandonment method is based upon guidance provided in the *Rocky Flats Well Abandonment/Replacement Program Plan* (EG&G, 1990b). Wells shall be abandoned by one of five methods in accordance with GT.11, *Plugging and Abandonment of Wells*.

The five methods of well abandonment include the following:

- casing pulling;
- casing destruction (i.e., drilling out casing);
- overdrilling;
- overcoring; and
- abandonment in place (i.e., without casing removal).

Under the FY 95 WARP project, all of the 47 proposed wells will be abandoned in place. This method conforms to the abandonment standards required under Rule 11.2, *Revised and Amended Rules and Regulations of the Board of Examiners of Water Well Construction and Pump Installation Contractors*, 2 CCR 402-2 (Code of Colorado Regulations [CCR], 1988). The in-place method has also been selected because the volume of investigative-derived materials is to be minimized. If this abandonment method is not appropriate due to unforeseen conditions, such as a well obstruction, the wells will be abandoned by one of the other four methods listed above which involve physical removal of the well casing and annular completion materials. Annular materials are removed to promote a good seal between the wellbore wall and the new grout used to fill and plug the wellbore.

Table 2.1.2-1 lists available well data and proposed methods of abandonment for each of the 47 wells to be abandoned. The planned abandonment method for a given well may need to be reconsidered if unexpected conditions (i.e., damaged or obstructed casing) are encountered. The appropriate method(s) of abandonment for a particular well depend upon well construction details and hydrogeologic setting.

**TABLE 2.1.2-1**
**Well information Summary for Well Abandonments**

| Well No. | Phase | State North | State East | Zone of Completion | Total Depth (ft) | Casing Material | Casing Diameter | Method of Abandonment |
|---|---|---|---|---|---|---|---|---|
| 5074 | 1 | 751066 | 2084732 | Bedrock | 13.8 | PVC | 3 inch | In Place |
| 5174 | 1 | 751070 | 2084934 | Bedrock | Unknown | PVC | 3 inch | In Place |
| 5274 | 1 | 751099 | 2085104 | Alv/Bdrk | 7.1 | PVC | 2 inch | In Place |
| 5374 | 2 | 750581 | 2086325 | Bedrock | 20.5 | PVC | 3 inch | In Place |
| 5474 | 2 | 751074 | 2086320 | Bedrock | 20.1 | PVC | 3 inch | In Place |
| 5574 | 1 | 749656 | 2084885 | Bedrock | 33.0 | PVC | 3 inch | In Place |
| 5674 | 1 | 750989 | 2086417 | Bedrock | 17.6 | PVC | 2 inch | In Place |
| 5774 | 1 | 750822 | 2086075 | Bedrock | 15.7 | PVC | 3 inch | In Place |
| 5874 | 2 | 751568 | 2085830 | Bedrock | 20.0 | PVC | 3 inch | In Place |
| 5974 | 2 | 751815 | 2085580 | Alv/Bdrk | 14.1 | PVC | 3 inch | In Place |
| 6074 | 1 | 752106 | 2085775 | Bedrock | 18.3 | PVC | 3 inch | In Place |
| 6174 | 1 | 752079 | 2085308 | Bedrock | 18.5 | PVC | 3 inch | In Place |
| 6274 | 2 | 751738 | 2085154 | Bedrock | 20.1 | PVC | 3 inch | In Place |
| 6374 | 2 | 751806 | 2084589 | Bedrock | 18.5 | PVC | 3 inch | In Place |
| 6474 | 2 | 752234 | 2084694 | Bedrock | 30.3 | PVC | 3 inch | In Place |
| 6574 | 2 | 752247 | 2084274 | Bedrock | 29.4 | PVC | 3 inch | In Place |
| 6674 | 2 | 752089 | 2083792 | Bedrock | 17.8 | PVC | 3 inch | In Place |



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# TABLE 2.1.2-1
## Well information Summary for Well Abandonments

| Well No. | Phase | State North | State East | Zone of Completion | Total Depth (ft) | Casing Material | Casing Diameter | Method of Abandonment |
|---|---|---|---|---|---|---|---|---|
| 6774 | 1 | 750954 | 2080140 | Alv/Bdrk | 58.8 | PVC | 3 inch | In Place |
| 1288 | 1 | 750830 | 2083490 | Alluvium ? | ~20 | PVC | 1 inch | In Place |
| 1388 | 1 | 750316 | 2084500 | Alluvium ? | ~20 | PVC | 1 inch | In Place |
| 0786 | 1 | 752827 | 2083977 | Alluvium | 10.0 | Steel | 2 inch | In Place |
| 0886 | 1 | 752817 | 2084001 | Bedrock | 71.5 | Steel | 2 inch | In Place |
| 5887 | 1 | 752234 | 2082531 | Alluvium | 32.0 | Steel | 2 inch | In Place |
| 6087 | 1 | 752930 | 2083035 | Alluvium | 32.0 | Steel | 2 inch | In Place |
| 6187 | 1 | 752860 | 2083072 | Alluvium | 34.0 | Steel | 2 inch | In Place |
| 6287 | 1 | 752800 | 2083097 | Alluvium | 30.0 | Steel | 2 inch | In Place |
| 6487 | 1 | 752329 | 2083261 | Alluvium | 28.0 | Steel | 2 inch | In Place |
| 6587 | 1 | 752230 | 2083299 | Alv/Bdrk | 27.0 | Steel | 2 inch | In Place |
| 6687 | 1 | 753164 | 2083774 | Alluvium | 23.0 | Steel | 2 inch | In Place |
| 6887 | 1 | 731145 | 2083776 | Alluvium | 20.0 | Steel | 2 inch | In Place |
| 7087 | 1 | 752571 | 2084196 | Alv/Bdrk | 17.0 | Steel | 2 inch | In Place |
| 7287 | 1 | 752441 | 2083953 | Alluvium | 15.0 | Steel | 2 inch | In Place |
| B106089 | 1 | 752310 | 2082580 | Alluvium | 27.5 | PVC | 4.5 inch | In Place |
| B206289 | 1 | 752253 | 2083564 | Bedrock | 47.5 | PVC | 4.5 inch | In Place |
| B206489 | 1 | 752427 | 2083964 | Alv/Bdrk | 41.5 | PVC | 4.5 inch | In Place |
| B206589 | 1 | 752458 | 2084121 | Bedrock | 41.5 | PVC | 4.5 inch | In Place |
| B206789 | 1 | 752818 | 2084161 | Bedrock | 30.0 | PVC | 4.5 inch | In Place |
| 00393 | 1 | 753173 | 2083768 | Alluvium | 16.8 | PVC | 2 inch | In Place |
| 00493 | 1 | 752533 | 2083930 | Alluvium | 12.0 | PVC | 2 inch | In Place |
| 71193 | 1 | 752566 | 2082717 | Alluvium | 36.0 | PVC | 2 inch | In Place |
| 71493 | 1 | 752517 | 2082741 | Alluvium | 26.0 | PVC | 2 inch | In Place |
| 71693 | 1 | 752237 | 2082923 | Alluvium | 28.3 | PVC | 2 inch | In Place |
| 71893 | 1 | 752174 | 2082951 | Alluvium | 28.0 | PVC | 2 inch | In Place |
| 72093 | 1 | 752550 | 2083206 | Alluvium | 37.6 | PVC | 2 inch | In Place |
| 72293 | 1 | 752774 | 2083808 | Alluvium | 34.6 | PVC | 2 inch | In Place |

**TABLE 2.1.2-1**
**Well information Summary for Well Abandonments**

| Well No. | Phase | State North | State East | Zone of Completion | Total Depth (ft) | Casing Material | Casing Diameter | Method of Abandonment |
|---|---|---|---|---|---|---|---|---|
| 72393 | 1 | 752552 | 2083196 | Alluvium | 24.4 | PVC | 2 inch | In Place |
| 72493 | 1 | 752770 | 2083803 | Alluvium | 30.2 | PVC | 2 inch | In Place |

Notes:

ft = feet
PVC = polyvinyl chloride

1. Phase 2 wells will be abandoned after July 1, 1995.
2. Wells 1288 and 1388 are undocumented piezometers believed to be less than 20 feet deep.
3. The following wells are located in or near the listed Potential Areas of Concern (PACs) or IHSSs: 5474, 5574 and 5674 @ NE-158.2; 1388 @ 700-150.6.
4. Wells 0786 through 72493 are located in or near IHSSs 114, 166, and 203

### 2.1.2.1 Casing Destruction

Casing destruction can be used only on wells with PVC casing. This method involves drilling out the well casing and annular completion materials with a rotary drill bit or auger. Procedures for drilling out casing are provided in GT.11, *Plugging and Abandonment of Wells*. The site geologist will determine through cuttings examination when all annular materials have been reamed from the borehole. The proposed well abandonments are not anticipated to require this method for the FY 95 WARP project.

### 2.1.2.2 Pulling Casing

Wells with steel, stainless steel, or cast iron casings shallower than a total depth of 30 feet can potentially be abandoned by casing pulling. It is possible that casings in some of these wells will exceed the available lifting capabilities of the drilling rigs, making it necessary to resort to overdrilling and overcoring or casing destruction. Procedures for pulling casing and casing destruction are provided in GT.11, *Plugging and Abandonment of Wells*. To perform the procedures in GT.11, it will be necessary to attach the well casing to the drilling rig hydraulic feed or the hydraulic jack. The appropriate method for accomplishing this will be determined by field personnel based on existing conditions at the particular well. The site geologist will determine through cuttings examination when all annular materials have been reamed from the borehole. The proposed well abandonments are not anticipated to require this method for the FY 95 WARP project.

### 2.1.2.3 Overdrilling and Overcoring

Overdrilling and overcoring employ a hollow-stem auger (i.e., overdrilling) or air-rotary coring bit (i.e., overcoring) to remove annular materials from around the casing to isolate and free it for removal. The only fundamental difference between the two methods is the drilling technique. Overdrilling, which is typically less time-consuming than overcoring, can be used only on relatively shallow wells where the casing is embedded in soft or unconsolidated materials. Overcoring is used as necessary on deeper wells and/or where the casing is embedded in consolidated rock. The decision regarding which of the two methods to use will be made in the field by drilling crews. In most situations, overdrilling may be used to a certain depth, at which time the drilling subcontractor will switch to overcoring. The proposed well abandonments are not anticipated to require this method for the FY 95 WARP project.

### 2.1.2.4 Abandonment in Place

Wells that do not penetrate a confined hydrostratigraphic unit may be grouted as described in Section 5.2.3 of GT.11. This abandonment method meets Rule 11.2 of 2 CCR 402-2, (CCR, 1988). Wells penetrating more than one aquifer or contaminant zone may also be abandoned with the casing left in place; providing that construction documentation indicates that the casing opposite each confining layer or between two contaminant zones has been properly grouted. This abandonment method meets Rule 11.2 of 2 CCR 404-2 (CCR, 1988). If the well is known to be nonviable due to absent or inadequate grouting, the casing in such intervals must be perforated or ripped.

All of the 47 monitoring wells will be abandoned in place during the FY 95 WARP project. This method will be appropriate because of historical well completions in the unconfined UHSU consisting of alluvial and weathered bedrock materials and well completions in the confined LHSU bedrock consisting of claystone and siltstone. This conclusion is based on the examination of the alluvial isopach maps *Geologic Characterization Report for the U.S. Department of Energy, Rocky Flats Plant*, (EG&G, 1991a) and *Geologic Characterization Report for the Rocky Flats Environmental Technology Site*, (EG&G, 1995c) and historical well construction records. Abandonment in place shall consist of replicating inside the well casing those annular materials surrounding the well. This will require filling the well screen interval with filter media, adding bentonite seal above the filter media, and grouting the remaining casing interval with bentonite grout to ground surface, placing a permanent water-tight cover (i.e., a locking j-cap) on the casing, and installation of a surface protective concrete slab with the appropriate well label. For the historical wells or piezometers located in paved roadways, the abandonment shall be performed as described with the following modification: The casing shall be cut off one foot below ground surface, a water-tight cover (i.e., a glued slip-cap) shall be put in place, and appropriately compacted backfill shall be placed into the excavation before installation of the concrete slab and well label.

### 2.1.3 Wellbore Grouting

After casing removal, well bores will be grouted in accordance with the procedures given in GT.05, *Plugging and Abandonment of Boreholes*. The proposed well abandonments for the FY 95 WARP project include only existing wells, not boreholes. In the event that boreholes are to be abandoned they will be grouted in accordance with the detailed procedures in GT.05.

### 2.1.4 Surface Protection

Surface protection features for abandoned wells are addressed in GT.11, *Plugging and Abandonment of Wells*. This includes the construction of a concrete slab at the surface of each abandoned well site. A permanent stainless steel well label will be affixed to each concrete slab. Upon completion of the surface protection task, abandoned wells will be land surveyed in accordance with GT.17, *Land Surveying*.

## 2.2 PROPOSED WELL INSTALLATIONS

Table 2.2-1 lists the proposed new and replacement groundwater monitoring wells for the FY 95 WARP project. This table also indicates the estimated total depth and well screen interval for each proposed well. To support the GMP, 11 new wells are proposed. Eleven groundwater monitoring wells are proposed in support of the IA OUs future decontamination and decommissioning activities. One well east of the NSL is proposed for replacement of well 0490, abandoned under WARP FY93. Five new groundwater monitoring wells are proposed for the OU1 French Drain. (Table 1.3.2-1 summarizes the siting rationale used for each proposed new and replacement groundwater monitoring well.)

**TABLE 2.2-1**
**Proposed New and Replacement Groundwater Monitoring Wells**

| Proposed Well No. | Approximate Colorado State Coordinates | | Proposed Well Depth (feet) | Est. Bedrock Depth (feet) | Est. Saturated Thickness (feet) | Approximate Well Screen Interval (feet) |
|---|---|---|---|---|---|---|
| | North | East | | | | |
| 53195 | 751887 | 2083924 | 18 | 16 | 5 | 11 - 16 |
| 53295 | 751787 | 2090660 | 24 | 22 | 18 | 12 - 22 |
| 53395 | 751215 | 2088895 | 11 | 9 | 5 | 4 - 9 |
| 53495 | 750201 | 2085589 | 19 | 17 | 5 | 12 - 17 |
| 53595 | 749730 | 2089030 | 27 | 25 | <5 | 20 - 25 |

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## TABLE 2.2-1
## Proposed New and Replacement Groundwater Monitoring Wells

| Proposed Well No. | Approximate Colorado State Coordinates | | Proposed Well Depth (feet) | Est. Bedrock Depth (feet) | Est. Saturated Thickness (feet) | Approximate Well Screen Interval (feet) |
|---|---|---|---|---|---|---|
| | North | East | | | | |
| 53695 | 749711 | 2085790 | 12 | 10 | <5 | 5 - 10 |
| 53795 | 749660 | 2085354 | 9 | 7 | <5 | 4 - 7 |
| 53895 | 748782 | 2089308 | 18 | 16 | unknown | 11 - 16 |
| 53995 | 748531 | 2086592 | 20 | 18 | unknown | 13 - 18 |
| 54095 | 748289 | 2086225 | 11 | 9 | unknown | 4 - 9 |
| 54195 | 747927 | 2087876 | 11 | 9 | <5 | 4 - 9 |
| 54295 | 750776 | 2082330 | 17 | 15 | 14 | 10 - 15 |
| 54395 | 750601 | 2083410 | 11 | 9 | <5 | 4 - 9 |
| 54495 | 750244 | 2082714 | 32 | 30 | 10 | 20 - 30 |
| 54595 | 705120 | 2083525 | 10 | 8 | 5 | 4 - 8 |
| 54695 | 750714 | 2083936 | 10 | 8 | <5 | 4 - 8 |
| 54795 | 751211 | 2083718 | 22 | 20 | 8 | 10 - 20 |
| 54895 | 750202 | 2084108 | 9 | 7 | <5 | 3 - 7 |
| 54995 | 749163 | 2084493 | 9 | 7 | <5 | 3 - 7 |
| 55095 | 748689 | 2082691 | 25 | 23 | 10 | 13 - 23 |
| 55195 | 750611 | 2082719 | 32 | 30 | 12 | 18 - 30 |
| 55295 | 750437 | 2082709 | 32 | 30 | 10 | 20 - 30 |
| 55395 | 751620 | 2079635 | 71 | 69 | 20 | 49 - 69 |
| 55495 | 747870 | 2084825 | 50 | 13 | unknown | 30 - 45 |
| 55595 | 747795 | 2084858 | 200 | 19 | unknown | 180 - 200 |
| 55695 | 747805 | 2084848 | 50 | 19 | unknown | 30 - 45 |
| 55795 | 747880 | 2084835 | 15 | 13 | 5 | 8 - 13 |
| 55895 | 747890 | 2084845 | 150 | 13 | unknown | 130 - 150 |

<u>Notes</u>:

1. All wells are planned for completions in basal alluvial materials, UHSU, except four wells in the French Drain (see note 5).
2. The following wells are located in or near the listed PAC or IHSSs: 53595 @ 216.3; 54595 @ 500-902; 54695 @ 700-118.1, 700-131, 700-132, 700-144, and 700-1100; 54795 @ 700-126.1, 700-126.2, 700-150.1; 54895 @ 700.4, 700-150.7; 54995 @ 800-164.2.

3. Depth to top of bedrock based on: Surficial Deposits Isopach Map, Plate 4-2, *Geologic Characterization Report* (EG&G, 1995c).
4. Saturated thickness based on: Plate 3, *Saturated Thickness of Unconsolidated Surficial Deposits, Second Quarter 1993*, *Hydrogeologic Characterization Report* (EG&G, 1994e).
5. At OU1, French Drain wells 55495 and 55695 will be cased through alluvial materials and have 15-foot well screen completions in weathered bedrock - UHSU. Wells 55595 and 55895 will have casing throughout alluvial materials, inner casing grouted in weathered bedrock, and 20-foot well screen completions in lower unweathered bedrock - LHSU.
6. An optional 6 wells at TBD locations may be installed if requested under the FY 95 WARP project.
7. Proposed wells 53195 through 54195 will meet requests of the GMP.
8. Proposed wells 54295 through 55295 will meet requests of the IA OUs.
9. Proposed well 55395 will meet requests for the NSL.
10. Proposed wells 55495 through 55895 will meet requests of OU1.

### 2.2.1 Pre-Drilling Activities

All wells planned for installation at the Site will require prior documentation to the Office of the State Engineer, Colorado Division of Water Resources. This will be implemented by completion of the Well Installation Notification Form GT.6A provided in GT.6, *Monitoring Well and Piezometer Installation.* This form will initiate the preparation of the permitting process through the *Notice of Intent to Construct a Well* and *Permit to Construct a Well* as required under Rule 6, 2 CCR 402-2 (CCR, 1988).

Before drilling, well locations will be cleared in accordance with GT.10, *Borehole Clearing*, and marked in accordance with GT.02, *Drilling and Sampling Using Hollow-Stem Auger Techniques*. A pre-work radiological survey will be conducted in accordance with FO.16, *Field Radiological Measurements*. Required permits will be obtained as described in Section 2.6. All necessary H&S protocols will be followed in accordance with the site HASPP (EG&G, 1990a) and the task-specific HASP prepared by the subcontractor.

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### 2.2.2 Wellbore Drilling

Some of the proposed wells are situated within areas where the saturated thickness may be minimal and significant groundwater may not be encountered in the alluvial materials. The following contingency procedure will be considered on a well-by-well basis: 1) complete the well in alluvial materials as originally planned; 2) continue drilling and complete the well in the underlying weathered bedrock; and 3) complete the well as planned and install an adjacent paired well in the weathered bedrock.

The wellbore will be drilled using hollow-stem auger techniques whenever possible. Detailed hollow-stem auger drilling and sampling procedures are provided in GT.02, *Drilling and Sampling Using Hollow-Stem Auger Techniques*. For the two deep wells, in harder intervals, or in cobbly surficial deposits, the wellbore will be rotary drilled or cored as provided in GT.04, *Rotary Drilling and Rock Coring*.

The 24 alluvial wells will be drilled through surficial materials to the bedrock top. An additional 2 feet of drilling will continue to create a cased well sump in bedrock. This shall be accomplished by driving a sampler in this interval. Caution shall be taken not to smear bedrock claystone cuttings on the basal interval of the surficial materials. This is important so as not to diminish the permeability in the completion interval immediately at the top of the bedrock. The proper identification of the surficial materials - bedrock contact by the site geologist shall be based upon the properties associated with these geologic media provided in GT.01, *Logging Alluvial and Bedrock Material* and from records of nearby wells. Drilling will reach proposed depths 2 feet in the weathered bedrock given in Table 2.2-1.

The two weathered bedrock wells will be drilled through surficial materials and then have grouted surface casings installed to isolate all surficial materials from the weathered top of the bedrock. Geotechnical procedure GT.03, *Isolating Bedrock From Alluvium with Grouted Surface Casing*, shall be followed. Drilling will continue to proposed depths in the weathered bedrock given in Table 2.2-1.

The two deep bedrock wells will be drilled through surficial materials and then have grouted surface casings installed to isolate all surficial materials from the weathered top of the bedrock. Geotechnical procedure GT.03, *Isolating Bedrock From Alluvium with Grouted Surface Casing*, will be followed. The drill bit size will be reduced to allow boring and installation of grouted weathered bedrock casing. The drill bit size will again be reduced to allow boring for installation of well screen and casing in the unweathered bedrock to surface. Drilling will continue to proposed depths in the unweathered bedrock given in Table 2.2-1. Geotechnical procedure GT.04, *Rotary Drilling and Rock Coring*, shall be followed.

Wellbore samples collected during implementation of the Field Sampling Plan, as described in Section 2.6, will be handled in accordance with FO.13, *Containerization, Preserving, Handling and Shipping of Soil and Water Samples*.

The well cuttings and cores will be logged in detail in accordance with GT.01, *Logging Alluvial and Bedrock Material*.

Decontamination and waste handling procedures pertaining to well installation are addressed in Sections 2.4 and 2.5.

### 2.2.3 Well Installation

Groundwater monitoring wells will be installed in accordance with GT.06, *Monitoring Wells and Piezometer Installation*, using 2-inch diameter PVC casing and factory-slotted well screen. All except four of the monitoring wells proposed will be completed as alluvial wells in the UHSU using single casing well designs. Well screens will be installed as near to the base of the alluvium as possible. Well sumps with end caps will be installed in the bedrock for all wells.

The two weathered bedrock wells, also in the UHSU, will have grouted surface casings to isolate all surficial materials from the weathered top of bedrock. Geotechnical procedure GT.03, *Isolating Bedrock From Alluvium with Grouted Surface Casing*, shall be followed. Factory-slotted well screens will be installed in the lower part of the weathered bedrock and 2-inch PVC riser pipe will be installed to surface. Well sumps with end caps will be installed in the bedrock for these wells.

The two deep bedrock wells will have grouted surface casings to isolate all surficial materials from the weathered bedrock. Geotechnical procedure GT.03, *Isolating Bedrock From Alluvium with Grouted Surface Casing*, will be followed. Grouted casing will extend through weathered bedrock casing to complete isolation of UHSU, consisting of surficial materials and weathered bedrock, from the LHSU, consisting of unweathered bedrock. Factory-slotted well screen in the lower 20 feet and casing in the remaining unweathered bedrock to surface will be used for the well. Well sumps with end caps will be installed in the bedrock for these two wells.

All new monitoring wells installed will be land surveyed in accordance with GT.17, *Land Surveying*.

## 2.3 GEOPHYSICAL SURVEYS

The deep wells 55595 and 56895 proposed at the OU1 French Drain will be geophysically logged to potentially acquire subsurface data used to identify the "A Marker" claystone described in the Geologic Characterization Report (EG&G, 1995c). These wellbores will be logged using a cased hole density log (with gamma-ray) and when applicable (1) natural gamma, (2) resistivity, and (3) self-potential or other geophysical methods in accordance with GT.15, *Geophysical Borehole Logging*.

As described in Section 1.3.4, a number of optional boreholes to support the Systematic Evaluation Program may possibly be needed[1]. If requested, these boreholes may also be geophysically surveyed and land surveyed in accordance with GT.17, *Land Surveying*. A cement well pad will be installed on each borehole drilled to meet the minimum standards as set forth in GT.06, *Monitoring Well and Piezometer Installation*.

## 2.4 WELLBORE INSPECTION

The services of a borehole camera, tripod, and winch system will be provided to the subcontractor by EG&G to determine the casing integrity, well screen, sump, and total depth of wells where needed. In addition, EG&G will provide a video cassette recorder (VCR), a video monitor, and video cassettes with the approval of site security. Video cassettes will be labeled with well location code, date, and "Property of U.S. DOE/RFFO."

Maintenance will also be performed on any well that requires maintenance to meet the minimum construction standards in GT.06, *Monitoring Wells and Piezometer Installation*. Three wells (i.e., P114589, 72093, and 723393) have been identified for inspection using a video camera. EG&G will perform the borehole video camera inspections. An additional three wells TBD are proposed for maintenance contingent upon well condition audit results of the GMP.

[1] WARP activities requested for additional borings in the Systematic Evaluation Program will require a modification of this Work Plan.

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## 2.5 EQUIPMENT DECONTAMINATION

Equipment used for WARP field operations will be decontaminated in accordance with FO.3, *General Equipment Decontamination*, and FO.04, *Heavy Equipment Decontamination*. Decontamination activities requiring the use of the site Main Decontamination Facility will be performed per the requirements of FO.12, *Decontamination Facility Operations*. Other operating procedures cross-referenced in FO.03, FO.04, and FO.12 contain additional applicable equipment-specific decontamination guidance.

Decontamination procedures will be implemented to minimize the following:

- potential cross-contamination;
- offsite contaminant migration; and
- personnel exposure from improperly decontaminated equipment.

The site geologist will be responsible for ensuring that all decontamination protocols specified in the operating procedures are followed.

## 2.6 ENVIRONMENTAL MATERIAL HANDLING, LABELING, AND DISPOSAL

WARP field operations will generate liquid and solid environmental investigation-derived materials (IDM). Liquid materials include drilling fluids, decontamination and wash water, and residual groundwater. Solid materials include drill cuttings, removed casing, surface soils, disposable personal protective equipment (PPE), and plastic. Handling and packaging of these materials will be conducted in accordance with waste handling procedures described in the *Hazardous Waste Requirements Manual 1-10000-HWRM* (EG&G, 1995g), and the following individual procedures: *1-94700-Traffic-110, On-Site Transportation Manual* (EG&G, 1993a), *1-C76-HWRM-08, Management of Satellite Accumulation Areas* (EG&G, 1994f), *1-C80-W01102-WRT, Waste/Residue Traveler*

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*Instructions* (EG&G, 1994g), *4-D99-WO-1100, Solid Radioactive Waste Packaging Inside of the Protected Area* (EG&G, 1994h), *1-C88-WP1027-NONRAD, Nonradioactive Waste Packaging* (EG&G, 1994i), and *4-C77-WO-1101, Solid Radioactive Waste Packaging Outside of the Protected Area* (EG&G, 1994j). Implementation of IDM waste handling and labeling shall follow these operating procedures:

- FO.6, *Handling of Personal Protective Equipment* — Applicable to personal protective equipment and plastic ground sheet used at worksites.
- FO.7, *Handling of Decontamination Water and Wash Water* — Applicable to decontamination and wash water.
- FO.8, *Handling of Drilling Fluids and Cuttings* — Applicable to drill cuttings, drilling fluids, surface soil, and residual groundwater displaced during well abandonment.
- FO.10, *Receiving, Labeling, and Handling Environmental Material Containers* — Provides guidance for the procurement, labeling, and use of environmental material containers (i.e., drums).
- FO.13, *Containerizing, Preserving, Handling and Shipping of Soil and Water Samples* — Provides guidance on sample containers, preservatives, labelling, decontamination, field packaging, chain of custody, documentation, packaging and shipping of field samples.
- FO.14, *Field Data Management* — Provides the method by which field data is recorded, entered into electronic media, validated, transferred, and filed with RFEDS.
- FO.23, *Management of Soil and Sediment Investigative Derived Materials* — Provides guidance for handling soil and sediment from the point of generation through the characterization process and includes the handling of drums in which these materials are contained.
- FO.29, *Disposition of Soil and Sediment Investigation-Derived Materials* — Provides the procedure for classifying drummed IDM.
- GT.02, *Drilling and Sampling Using Hollow-Stem Auger Techniques* — Provides guidance for obtaining geochemical data to characterize environmental materials placed into drums.

- GT.11, *Plugging and Abandonment of Wells* — Provides information on handling and disposal of removed casing and additional information on handling and disposal of displaced residual groundwater.

- 1-94700-Traffic-110, On-Site Transportation Manual (EG&G, 1993a) — Provides information on using and completing the radioactive on-site transfer label (RF-46751) for radioactive wastes.

- 1-C76-HWRM-08, Management of Satellite Accumulation Areas (EG&G, 1994f) — Provides information on using and completing the hazardous waste label (RF-47257) for IDM waste drums.

- 1-C80-W01102-WRT, Waste/Residue Traveler Instructions (EG&G, 1994g) — Provides information on using and completing the waste residue traveler (RF-47386) affixed to IDM waste drums.

- 4-D99-WO-1100, Solid Radioactive Waste Packaging Inside of the Protected Area (EG&G, 1994h) — Provides waste generator instructions to generate certifiable packages of solid radioactive and mixed waste in the PA.

- 1-C88-WP1027-NONRAD, Nonradioactive Waste Packaging (EG&G, 1994i) — Provides instructions and requirements for segregating and packaging nonradioactive waste in compliance with state and federal regulations.

- 4-C77-WO-1101, Solid Radioactive Waste Packaging Outside of the Protected Area (EG&G, 1994j) — Provides waste generators instructions to generate certifiable containers of solid radioactive and mixed waste outside the PA.

The EG&G WARP project manager will be Waste Generator Qualified to ensure that potential hazardous and/or radioactive wastes meet certification criteria. The site geologist will be responsible for proper handling of environmental materials at the worksites, proper labeling of environmental material containers, and completion of required forms and documentation. The field supervisor will be responsible for coordinating the removal and transfer of all environmental materials from the project work areas to the designated transfer area. The data manager will be responsible for entering appropriate location code numbers and sample numbers into a database compatible with input into RFEDS in accordance with applicable operating procedures provided in FO.14, *Field Data Management*.

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Operating procedure FO.23, *Management of Soil and Sediment Investigation Derived Materials*, describes the conditions under which annular materials will be contained in drums. If the monitoring well to be installed or abandoned is located in an area of concern (i.e., RCA, IHSS, PAC, and additional area of concern [AAC]), or if field screening indicates that constituent concentrations are above the ambient levels as measured by field instruments, then annular material brought to the surface will be composite sampled for waste determination. This will be conducted at a minimum of every 10 feet as described in GT.02, *Drilling and Sampling Using Hollow-Stem Auger Techniques* and as described below before being drummed. Annular material will also be drummed at the direction of the EG&G project manager or designee.

Replacement well installations will use analytical data generated during soil sampling (GT.02) if located in any of the above referenced areas of concern and on the basis of results of field screening (FO.15, FO.16, and FO.23). Annular material samples (labeled with a prefix BP) will be submitted for analysis for a minimum of Target Compound List (TCL)/Volatile Organic Analysis (VOA), selected radionuclides, and Total Target Analyte List (TAL)-metals. Specific analytes of radionuclide analysis will include gross alpha, gross beta, uranium 233/234, 235, and 238, plutonium 239/240, americium 241, strontium 89/90, cesium 137, and radium 226/228.

The subcontractor field supervisor will ensure that the following duties are executed by subcontractor personnel:

- Arranging for the appropriate waste drums to be collected from the well site and transferred to the appropriate storage area.
- Ensuring waste materials are not commingled and are properly segregated (i.e., PPE with other solid wastes).
- Ensuring drums are properly filled, stabilized for free liquid, labeled, and positioned in the field.

- Ensuring all documentation is completed properly and a tracking system is implemented that shall account for each drum.

- Assisting with periodic inspections of drums issued for WARP by EG&G.

- Arranging for drum transfer to EG&G.

## 2.7 FIELD SAMPLING PLAN

The Field Sampling Plan has been prepared to meet or exceed the OU1 *Final Phase III Work Plan, OU1 - 881 Hillside* (U.S. DOE, 1991), OU2 *Phase II RFI/RI Work Plan Alluvial, Manual No. 21100-WP-OU 02.1* (EG&G, 1991b), *OU5 Phase I RFI/RI Work Plan, Woman Creek Priority Drainage, (Operable Unit No. 5)* (EG&G, 1991c), and OU6 *Phase I RFI/RI Work Plan, Walnut Creek Priority Drainage, (Operable Unit No. 6)* (EG&G, 1991d) RCRA Facility Investigation/Remedial Investigation (RFI/RI) sampling and analytical requirements and to meet the general sitewide sampling and analytical requirements. However, the objective for WARP field sampling is to determine the presence and estimate the extent of certain chemical constituents and radionuclides in the recovered geologic materials. Drilling and sampling of geologic materials during the installation of new or replacement groundwater monitoring wells will be performed in accordance with GT.02, *Drilling and Sampling Using Hollow-Stem Auger Techniques* and GT.04, *Rotary Drilling and Rock Coring*. Sample labeling, handling, and shipping will be performed in accordance with FO.13, *Containerization, Preserving, Handling and Shipping of Soil and Water Samples.*

All laboratory work will be completed according to the U.S. Environmental Protection Agency's (EPA) Contract Lab Program (CLP) standards. The CLP-type analysis is outlined in Version 3.0 of the *General Radiochemistry and Routine Analytical Service Protocol* (GRRASP) (EG&G, 1994k). The data quality objectives are specified in the QAPjP (EG&G 1994b). An excerpt from this document is in Appendix B.

Soil samples will be collected during the drilling of the wells and submitted for analysis of TCL/VOA, selected radionuclides, and TAL-metals. Specific analytes of radionuclide analysis will include gross alpha, gross beta, uranium 233/234, 235, and 238, plutonium 239/240, americium 241, strontium 89/90, cesium 137, and radium 226/228. The specific analytes are listed in Appendix A. The protocol for VOA sampling is as follows:

- VOA samples will be collected in stainless-steel circular sleeves inserted into the downhole end of the core barrel. The 0.25-ft long sleeve will be immediately capped with Teflon® and plastic end-caps when it comes out of the borehole, then sealed in a polyethylene bag.
- The first sample will be collected between 1.75 to 2.00 feet, then every 4 feet, thereafter.
- Except for the first wet (i.e., saturated) sample, VOA sampling ceases when drilling intersects the water table. Sampling also ceases after the first sample into bedrock.
- A radiological screen sample will be collected for each VOA sample in accordance with FO.18, *Environmental Sample Radioactivity Content Screening*.
- Composite samples for radionuclides and Total CLP-metals will be collected in accordance with GT.02, *Drilling and Sampling Using Hollow Stem Auger Techniques* and FO.18, *Environmental Sample Radioactivity Content Screening* as follows:
- Composite samples are composed of metal and radionuclide samples collected from drill core that is scraped with a stainless-steel spatula into a stainless-steel bowl and homogeneously mixed.
- Samples will be collected in 6-foot intervals. If the interval to be sampled is less than 6 feet, then the composite sample will be collected from this remaining interval.
- Sampling will cease below the interval that intersects the water table. Sampling will also cease after the sample interval intersects the bedrock.
- A radiological screen sample will be collected for each composite sample collected in accordance with FO.18, *Environmental Sample Radioactivity Content Screening*.

Duplicate and equipment blank quality control (QC) samples will be collected according to instructions in GT.02, *Drilling and Sampling Using Hollow Stem Auger Techniques*.

The sample frequency for duplicate and equipment blanks will be one in 10 and one in 20, respectively. Equipment blank QC samples will be analyzed for TCL/VOA, gross alpha, gross beta, and TAL metals. Duplicate QC samples will be analyzed for the same target analytes as the real samples.

## 2.8 PERMITS

Permits and procedures for authorizing intrusive work at the site are discussed in GT.10, *Borehole Clearing*. Drilling activities will require soil disturbance approval as provided in GT.24, *Approval Process for Construction Activities on or Near Individual Hazardous Substance Sites (IHSSs)* and being revised as Level 1 Procedure: 1-F20-ER-EMR-EM.001 Environmental Approval Process for Construction Activities on or Near Individual Hazardous Substance Sites (IHSSs). Access permits are also required for work in some restricted areas at the site. A Radiation Work Permit (RWP) may be required for abandonment of wells in the vicinity of IHSS 101, north of the SEPs. The project-specific HASP will outline access permits required due to H&S concerns. A project-specific land use request permit will also be required as specified in GT.24.

Actions relating to the wells, located in the flood plains, that are proposed for installation shall be reviewed to maintain compliance with the National Environmental Policy Act (NEPA) 42 U.S. Code (USC) 4321 et seq. and the requirements of 10 Code of Federal Regulation (CFR) Part 1021 and Part 1022.

## 2.9 FIELD COMMUNICATIONS

Site field communications will follow protocols described in FO.11, *Field Communications*. A short training session on the use of site telephones and radios will be conducted by EG&G for the subcontractor field personnel. Communication protocols and emergency signals will be included in the training. In an emergency, procedures outlined in the task-specific HASP and the Site HASPP shall be followed.

A WARP project office will be established in the trailer T891P in the subcontractor's area at the Site. This trailer has a telephone. Field teams will use two-way radios for communication with the field office and other field teams. The buddy system will be used during all well site activities (i.e., all project work except Site travel or work in the subcontractor trailer T891P will be conducted in pairs or groups of personnel).

## 2.10 RECORDS AND REPORTS

Daily WARP field activity documentation shall entail completion by the site geologists of all field forms specified in the operating procedures. Field data will be managed in accordance with FO.14, *Field Data Management*. In addition, field activity daily logs shall be maintained by the site geologists. These logs will contain a chronological account of the day's activities, and shall include interpretations of the final subsurface conditions including borehole stability and water level. Particular attention shall be given to documenting the quantity of grout used in each borehole or well casing and the total drilling depth. The groundwater-level and well depth before abandonment shall be recorded, and any unusual conditions shall be documented. At the end of each day, a signed copy of the daily logs shall be presented to the field supervisor for review and filing and a weekly transmittal will be sent to the EG&G WARP project manager. A sample tracking spreadsheet will be maintained by the contractor for use in tracking sample collection and shipment. EG&G will supply the spreadsheet format and will stipulate timely reporting of information. This data will also be delivered to EG&G on 3.5-inch computer diskettes. Computer hardware and software requirements for contractors using government-supplied equipment will be furnished by EG&G. Computer and data security measures will also follow acceptable procedures outlined by EG&G.

Project reporting for WARP by the subcontractor will consist of the following:

- **Daily Contact** - The field supervisor shall verbally apprise the EG&G WARP project manager or designee of project progress on a daily basis.

- **Weekly Reports** - During field activities, weekly memos will be prepared by the field supervisor and faxed to the EG&G WARP project manager. These memos will summarize project activities of the prior week, contain charts of progress for the wells abandoned and installed, describe any additional needs or support required for the following two weeks, and describe any problems encountered.

- **Data Reports** - Field data will be input to RFEDS using a remote data entry module with IBM compatible software versions: Datacap 3.0, Logit 1.5, and Logger 7.0 supplied by EG&G. Data will be entered on a 3.5-inch computer diskette and will be delivered to EG&G on a timely basis. Procedures for data QC, verification, entry into RFEDS, archiving, and security will follow FO.14 *Field Data Management*.

- **WARP Report** - A report will be prepared following completion of WARP FY 95 field activities that will detail the performance and results of the project. A report appendix will include an evaluation of the well class and the well's activity status.

- **WARP Geochemical Report Addendum** - A geochemical report will be prepared before completion of the WARP contractual period of performance. The report will present the analytical results of geologic media borehole samples from WARP FY 95. Geochemical data will be compared to the background constituent concentrations for similar media as presented in the *Background Geochemical Characterization Report, Rocky Flats Plant* (EG&G, 1993b).

- **Notification Letters** - Copies of well abandonment logs and forms and well installation logs and forms for each well, along with a summary letter explaining the activities, will be delivered to EG&G for submittal to DOE/Rocky Flats Field Office (RFFO).

- **State Well Abandonment Forms** - Copies of the State of Colorado Well Abandonment Report form (GWS-9) (CCR, 1988) for each abandoned well shall be completed and submitted to EG&G upon completion of FY 95 WARP field activities.

- **State Well Permit Application Forms**—A Well Installation Notification form (GT.6A) for each new well shall be completed as specified in GT.6, *Monitoring Well and Piezometer Installation*. Upon receipt of form GT.6A, EG&G will submit the Notice of Intent to Construct a Well. The subcontractor will provide information and complete for each installed well the State of Colorado Well Permit Application form (WRJ-5-Rev. 76), (CCR, 1988). The subcontractor shall submit the completed form to EG&G upon completion of WARP FY 95 field activities.

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# APPENDIX B

## Project Plan for Real-Time Radioactivity Monitoring of the Industrial Area

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# Project Plan for
# Real-Time Radioactivity Monitoring of the Industrial Area

U.S. Department of Energy
Rocky Flats Environmental Technology Site
Golden, Colorado

Environmental Protection Management

November 1994
Version 0

Approved by: S. G. Marshall 11/14/94

Reviewed for Classification/UNCI
By George Horton U/NU
Date 11/14/94

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## 1.0 PURPOSE OF PROJECT

### 1.1 Project Objective

The purpose of the real-time radioactivity monitoring (RTRM) project is to design, fabricate, laboratory test, and baseline a novel configuration of a continuous, real-time radiological monitoring system for surface water in the RFETS industrial area. Placed at strategic locations around the industrial area or other areas of concern, the RTRM will provide early indications of, and allow response to off-normal levels of radioactivity in surface water.

### 1.2 Project Background

To protect and allow early response to potential radiological releases during cleanup or decontamination & Decommissioning (D&D) activities, radiological monitoring of surface water flows in the industrial area is prescribed in the Industrial Area IM/IRA. Pu, Am, and U are the most likely contaminants at RFETS. Presently, it requires weeks to obtain analytical results for water samples. Improved radiological monitoring will provide early detection of, and response to releases of radioactive materials that may enter the surface water as a result of D&D, environmental restoration (ER), or other activities. RTRM of RFETS remediation and D&D activities in the industrial area or other concern or activity-specific locations is proposed, and will be accomplished by a novel combination of existing technologies, and will support both D&D and ER activities.

The project concept uses continuous measurement of the aqueous streams using alpha or gamma spectrometry. Radioactivity monitoring information will be transmitted over existing telemetry networks for computerized data acquisition and assessment. The system will record and transmit flowrate and radiometric information on an hourly (or less) basis.

## 2.0 OVERVIEW OF WORK SCOPE

### 2.1 Establish RTRM Requirements

Determine technical requirements for the monitoring system, i.e., detection limit, etc., and establish sufficiencies and deficiencies in existing technology for meeting those requirements. Also, determine cost and schedule availability of technology.

### 2.2 Prepare RTRM Project Plan

Prepare and gain approval of project plan for provision of RTRM system. (This document.)

### 2.3 Prepare RTRM System Technical Design Document

Prepare and promulgate technical design or technical project plan document. The technical design document will provide the technical basis and technical design for the RTRM system.

### 2.4 Design and Fabrication of RTRM System

Produce formal RTRM system design. Procure components, assemble and integrate system components/subsystems into functioning prototype.

### 2.5 Demonstrate and Refine RTRM System

Conduct testing of RTRM System prototype in laboratory environment. Evaluate system performance; determine and complete any design improvements and provide integration for radiotelemetry.



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2.6 Install, Integrate, and Baseline RTRM System

Plan and complete field installation of RTRM System. Determine system baseline. Integrate RTRM system with existing radiotelemetry and data acquisition systems.

## 3.0 APPLICABILITY OF THE PROJECT PLAN

This project plan controls the project planning for, and the design, fabrication/construction, and baseline evaluation of a real-time radioactivity monitoring (RTRM) system to accomplish the purpose, objectives, and work scope outlined in Sections 1 and 2 (above).

## 4.0 ORGANIZATION AND INTERFACES

4.1 Project Activities and Responsibility Matrix:

| Major Activity/Task (Est. Effort) * | Responsibility ** |
|---|---|
| FY95 | |
| Project Management (50 hr) | Surface Water (K. Motyl) |
| Establish RTRM Requirements (60 hr) | Surface Water / Technical Investigations |
| Prepare RTRM Project Plan (40 hr) | Surface Water / Technical Investigations |
| Prepare RTRM System Technical Design Document (100 hr) | Technical Investigations/Surface Water |
| Procure RTRM Components and Stds (80 hr) | Technical Investigations |
| Design, | Surface Water / Technical Investigations |
| Fabrication, and Calibration of RTRM (300 hr) | Technical Investigations |
| Demo and Refine RTRM System (200 hr) | Technical Investigations |
| Prepare FY95 Interim Report (100 hr) | Technical Investigations |
| *• FY95 TOTAL (930 hr)* | |
| FY96 | |
| Project Management (50 hr) | Surface Water (K. Motyl) |
| Prepare Installation Design (320 hr) | Technical Investigations / Engineering |
| Procure RTRM Components (100 hr) | Technical Investigations /Surface Water |
| Install, | Technical Investigations / Maintenance |
| Integrate, and S/O Test (500 hr) | Technical Investigations / Surface Water |
| Baseline RTRM System (100 hr) | Technical Investigations |
| Prepare Final Report (100 hr) | Technical Investigations / Surface Water |
| *• FY96 TOTAL (1170 hr)* | |
| *• PROJECT TOTAL (2100 hr)* | |

* Times are estimates of effort required to complete activity and are not interpretable as total activity durations.
** Lead organization for each major task is listed first.

## 5.0 PROJECT PLAN SCHEDULE

The project schedule is:

| FY-95 Activity | Completed |
|---|---|
| RTRM Project Plan | November 17, 1994 |
| Technical Design Package | December 16, 1994 |
| Specification/Procurement | March 15, 1995 |
| Laboratory Evaluation | May 15, 1995 |
| Laboratory Demonstration | August 15, 1995 |
| FY-95 Report | September 15, 1995 |
| FY-96 Activity | |
| "Harden" Instrumentation | November 30, 1995 |
| Install, S/O Testing, Baseline | June 15, 1996 |

Note that a detailed project basis and design will be described in a full and formal technical project plan deliverable December 16, 1994. The project will continue into FY-96. A project timeline and table appear in the Appendix.

## 6.0 TASK DESCRIPTIONS

### 6.1 Identification of Associated Work Packages

This activity is funded under Work Package 12196 and supports the goals of the larger, Industrial Area Interim Measures/Interim Remedial Action (IA IM/IRA) project.

### 6.2 Task Justification

This project supports monitoring requirements described in the IA IM/IRA. The project provides improved monitoring of industrial effluents and an early alert of off-normal emissions of radioactive effluents from cleanup or D&D activities.

### 6.3 Task Deliverables

This project provides the following major deliverables:

- Project Plan
- RTRM Technical Design Document
- Interim FY95 Report of Laboratory Demonstration of RTRM System
- Installed and Baselined RTRM System
- Final Report

### 6.4 Task Acceptance Criteria

The Project Manager will assure that document reviews for the project will be conducted according to the Environmental Protection Management (EPM) procedure, Document Review, 3-21000-ADM-06.01. As the RTRM system is administered by M. Buddy (ER Indust OUs), his (or designee's) acceptance of the final product will be assured by quality submittals of: an approved project plan and periodic progress reports, and interim and final reports.

6.5 Task Procedures

The Project Manager will assure that data and information sources are properly documented in hardcopy/project notebooks. The RTRM project will follow the project plan and applicable requirements of the Environmental Protection Management Program Plan or otherwise agreed to by management. Technical laboratory tasks will be accomplished in accordance with existing, applicable JSAs, OSAs, and procedures in Technical Investigations. The Project Manager will assure reports will be prepared, reviewed, and approved in accordance with Rocky Flats standard format and EPM procedure, Document Review.

6.6 Task Records

Scientific and technical project information will be documented according to standard scientific notebook practice and be controlled according to the ERM Procedure, Control of Scientific Notebooks (2-G06-ER-ADM-05.10, Rev 0.1, Draft). The Project Manager will assure any records used in developing, or required to substantiate the project will be controlled according to Records Management Guidance for Records Sources, 1-77000-RM-001. The final RTRM report will be controlled, as appropriate, according to Document Control Procedure, 3-21000-ADM-06.01.

6.7 Task Required Resources and Funding

The RTRM project is a cooperative and joint effort between WM and Waste Stabilization (WS) divisions. SW and Technical Investigations (TI) have assumed the lead role for assessment, concept development, and the provision of the RTRM.

The RTRM project is funded under FY95 Work Package (WP) 12196 specifically under the "Implementation of Surface Water Proposed Actions," Activity 12196130. The FY95 charge number for this activity is 986540-00.

| <u>FY-95 Activity</u> | <u>Funding</u> | |
|---|---|---|
| Labor | 930 hrs | |
| Non-Labor | \$ 50 K | |
| Travel | \$4.5 K | ? |
| SUBTOTAL (FY95)* | \$ <u>143</u> K | |
| <u>FY-96 Activity</u> | | |
| Labor | 1170 hrs | |
| Non-Labor (six RTRM systems) | \$ 350 K | |
| Travel | \$ 3 K | |
| SUBTOTAL (FY96)* | \$ <u>464</u> K | |
| TOTAL (FY95+96)* | \$ <u>607</u> K | |

* Totals based on nominal labor rate of \$95 per hour.

## 7.0 ENVIRONMENTAL, SAFETY, AND HEALTH COMPLIANCE

The main driver of the RTRM project is the IA IM/IRA which has as its basis in the protection of human health and the environment under Comprehensive Environmental Response Compensation and Liability Act (CERCLA). IM/IRA's are designed to address an imminent threat of damage to health or the environment. The completed and installed RTRM system will enable just that with early detection of off-normal or elevated levels of radioactivity in surface waters in and about the industrial area.

Potentially applicable or pertinent requirements include: Clean Water Act (CWA)/NPDES, Safe Drinking Water Act (SDWA), Resource Conservation and Recovery Act (RCRA), CERCLA, DOE Orders 5400.1, 5400.5, 5700.6C, as well as pertinent state statutes and site-specific agreements (AIP, LDR FFCA, NPDES FFCA) and standards (CWQCC stream standards).

## 8.0 PROJECT PLAN REQUIREMENTS (CONSTRAINTS)

IM/IRA's are intended to govern interim actions to address/mitigate the spread of contamination, and any actions or measures must be consistent with the final CERCLA action. The accepted timeframe for these interim measures is 3 to 5 years. The RTRM project is a response to IM/IRA requirements for enhanced monitoring of industrial-area activities — environmental restoration and D&D — that present the potential for release of increased levels of contamination. Extensive evaluations of water quality have indicated small but persistent contaminant sources. This together with the presence of some 178 individual hazardous substance sites (IHSSs) argue for real-time monitoring of major surface water sub-basins within the industrialized area of RFETS to guard against the further spread of radioactivity.

## 9.0 TRAINING AND QUALIFICATIONS

Qualified and trained personnel will be used for administrative, technical, and operational tasks described in this plan. Minimum training requirements include HS education and completion of RFETS core training curriculum. The applicability of other task-specific qualifications and training will be made by the project manager, or by the line manager of the organization(s) completing the operational tasks or providing the guidance or other technical services.

## 10.0 PROJECT PLAN GLOSSARY

### 10.1 Abbreviations and Acronyms

| | |
|---|---|
| CERCLA | Comprehensive Environmental Response and Comprehensive Liability Act |
| D&D | Decontamination & Decommissioning |
| ER | environmental restoration |
| ERM | Environmental Restoration Management |
| FFCA | Federal Facilities Compliance Agreement |
| HS&E | Health, Safety & Environment |
| IHSS | individual hazardous substance sites |
| IA IM/IRA | Industrial Area Interim Measures / Interim Remedial Action (document) |
| JSA | Job safety analysis |
| NPDES | National Pollutant Discharge Elimination System |
| OSA | Operational safety analysis |
| OU | operable unit |
| pCi/L | picoCurie per liter |
| RCRA | Resource Conservation and Recovery Act |
| RFFO | Rocky Flats Field Office (Department of Energy) |
| RFETS | Rocky Flats Environmental Technology Site |
| RTRM | Real-time radioactivity monitor(ing) |
| Site | Rocky Flats Environmental Technology Site |
| SW | Surface Water (group) |
| TI | Technical Investigations (group) |
| WM | Waste Management |
| WQ | water quality |

# Appendix I

## Outline for Real-Time Radioactivity Monitoring Final Report

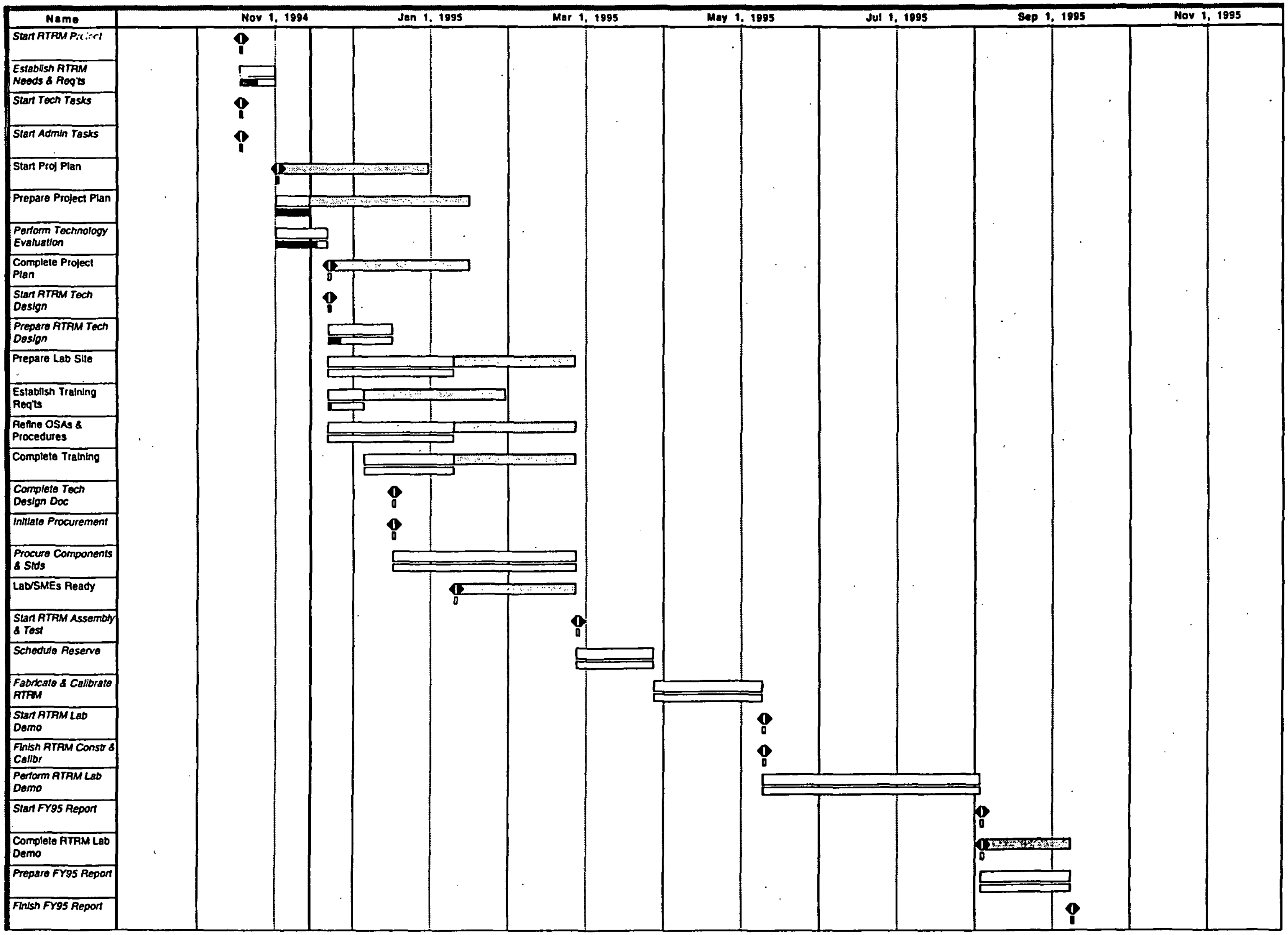
1.0 Abstract/Executive Summary
2.0 Introduction
- 2.1 Project requirements
- 2.2 Project approach
- 2.3 Technology introduction
- 2.4 Project milestones

3.0 Methods and approach
- 3.1 Objectives and rationale
- 3.2 Technical approach
  - 3.2.1 Technical design basis
  - 3.2.2 Technology description
  - 3.2.3 Features and benefits
- 3.3 Technical design and documentation
  - 3.3.1 Design requirements
  - 3.3.2 Detailed design
- 3.4 Fabrication and construction
  - 3.4.1 Components
  - 3.4.2 Equipment and materials
- 3.5 Operation and calibration
- 3.6 Sampling and measurement
  - 3.6.1 Source stream
  - 3.6.2 Monitoring process
- 3.7 Field demonstration
  - 3.7.1 Site selection and preparation
  - 3.7.2 Installation
  - 3.7.3 Baselining
- 3.8 Data management
- 3.9 Deviations from design and operating plans

4.0 Results and Discussion
- 4.1 Design and construction
- 4.2 Calibration and operations
- 4.3 Sampling and measurement
- 4.4 Data analysis and interpretation
  - 4.4.1 Analysis of test data
  - 4.4.2 Comparison to test objectives
- 4.5 Improvement and scale-up
- 4.6 Field demonstration
  - 4.6.1 Site selection and preparation
  - 4.6.2 Installation
  - 4.6.3 Baselining
- 4.7 Costs/schedule summary

5.0 Conclusions and Recommendations
- 5.1 Conclusions
- 5.2 Recommendations

6.0 Quality assurance/quality control
7.0 Key contacts
References
Append ices
A. Summary data sheets, lab results, MSDSs
B. Data summaries
C. Standard operating procedures


Name
Nov 1, 1994
Jan 1, 1995
Mar 1, 1995
May 1, 1995
Jul 1, 1995
Sep 1, 1995
Nov 1, 1995
Start RTRM Project
Establish RTRM Needs & Req'ts
Start Tech Tasks
Start Admin Tasks
Start Proj Plan
Prepare Project Plan
Perform Technology Evaluation
Complete Project Plan
Start RTRM Tech Design
Prepare RTRM Tech Design
Prepare Lab Site
Establish Training Req'ts
Refine OSAs & Procedures
Complete Training
Complete Tech Design Doc
Initiate Procurement
Procure Components & Stds
Lab/SMEs Ready
Start RTRM Assembly & Test
Schedule Reserve
Fabricate & Calibrate RTRM
Start RTRM Lab Demo
Finish RTRM Constr & Calibr
Perform RTRM Lab Demo
Start FY95 Report
Complete RTRM Lab Demo
Prepare FY95 Report
Finish FY95 Report

| Name | Critical | Task ID | Earliest Start | Earliest Finish | Latest Start | Latest Finish | Task Duration | Slack | % Done | Resource $ | Total Cost | Type |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start RTRM Project | ✔ | 9165 | Oct 17, 1994 | Oct 17, 1994 | Oct 17, 1994 | Oct 17, 1994 | 0 | 0 | 100 | 0.00 | 0.00 | Milestone |
| Establish RTRM Needs & Req'ts | ✔ | 9185 | Oct 17, 1994 | Oct 31, 1994 | Oct 17, 1994 | Oct 31, 1994 | 10 | 0 | 50 | 0.00 | 0.00 | Task |
| Start Tech Tasks | ✔ | 9255 | Oct 17, 1994 | Oct 17, 1994 | Oct 17, 1994 | Oct 17, 1994 | 0 | 0 | 100 | 0.00 | 0.00 | Milestone |
| Start Admin Tasks | ✔ | 9260 | Oct 17, 1994 | Oct 17, 1994 | Oct 17, 1994 | Oct 17, 1994 | 0 | 0 | 100 | 0.00 | 0.00 | Milestone |
| Start Proj Plan | | 9305 | Oct 31, 1994 | Oct 31, 1994 | Dec 30, 1994 | Dec 30, 1994 | 0 | 39 | 100 | 0.00 | 0.00 | Milestone |
| Prepare Project Plan | | 9170 | Oct 31, 1994 | Nov 14, 1994 | Dec 30, 1994 | Jan 16, 1995 | 10 | 39 | 98 | 0.00 | 0.00 | Task |
| Perform Technology Evaluation | ✔ | 9180 | Oct 31, 1994 | Nov 21, 1994 | Oct 31, 1994 | Nov 21, 1994 | 15 | 0 | 80 | 0.00 | 0.00 | Task |
| Complete Project | | 9175 | Nov 21, 1994 | Nov 21, 1994 | Jan 16, 1995 | Jan 16, 1995 | 0 | 34 | 0 | 0.00 | 0.00 | Milestone |
| Start RTRM Tech Design | ✔ | 9190 | Nov 21, 1994 | Nov 21, 1994 | Nov 21, 1994 | Nov 21, 1994 | 0 | 0 | 100 | 0.00 | 0.00 | Milestone |
| Prepare RTRM Tech Design | ✔ | 9200 | Nov 21, 1994 | Dec 16, 1994 | Nov 21, 1994 | Dec 16, 1994 | 19 | 0 | 20 | 0.00 | 0.00 | Task |
| Prepare Lab Site | | 9280 | Nov 21, 1994 | Jan 10, 1995 | Jan 16, 1995 | Feb 27, 1995 | 30 | 34 | 0 | 0.00 | 0.00 | Task |
| Establish Training | | 9290 | Nov 21, 1994 | Dec 5, 1994 | Jan 16, 1995 | Jan 30, 1995 | 10 | 34 | 10 | 0.00 | 0.00 | Task |
| Refine OSAs & Procedures | | 9295 | Nov 21, 1994 | Jan 10, 1995 | Jan 16, 1995 | Feb 27, 1995 | 30 | 34 | 0 | 0.00 | 0.00 | Task |
| Complete Training | | 9285 | Dec 5, 1994 | Jan 10, 1995 | Jan 30, 1995 | Feb 27, 1995 | 20 | 34 | 0 | 0.00 | 0.00 | Task |
| Complete Tech Design Doc | ✔ | 9245 | Dec 16, 1994 | Dec 16, 1994 | Dec 16, 1994 | Dec 16, 1994 | 0 | 0 | 0 | 0.00 | 0.00 | Milestone |
| Initiate Procurement | ✔ | 9265 | Dec 16, 1994 | Dec 16, 1994 | Dec 16, 1994 | Dec 16, 1994 | 0 | 0 | 0 | 0.00 | 0.00 | Milestone |
| Procure Components & Stds | ✔ | 9195 | Dec 16, 1994 | Feb 27, 1995 | Dec 16, 1994 | Feb 27, 1995 | 45 | 0 | 0 | 0.00 | 0.00 | Task |
| Lab/SMEs Ready | | 9300 | Jan 10, 1995 | Jan 10, 1995 | Feb 27, 1995 | Feb 27, 1995 | 0 | 34 | 0 | 0.00 | 0.00 | Milestone |
| Start RTRM Assembly & Test | ✔ | 9270 | Feb 27, 1995 | Feb 27, 1995 | Feb 27, 1995 | Feb 27, 1995 | 0 | 0 | 0 | 0.00 | 0.00 | Milestone |
| Schedule Reserve | ✔ | 9330 | Feb 27, 1995 | Mar 27, 1995 | Feb 27, 1995 | Mar 27, 1995 | 20 | 0 | 0 | 0.00 | 0.00 | Task |
| Fabricate & Calibrate RTRM | ✔ | 9205 | Mar 27, 1995 | May 9, 1995 | Mar 27, 1995 | May 9, 1995 | 30 | 0 | 0 | 0.00 | 0.00 | Task |
| Start RTRM Lab Demo | ✔ | 9220 | May 9, 1995 | May 9, 1995 | May 9, 1995 | May 9, 1995 | 0 | 0 | 0 | 0.00 | 0.00 | Milestone |
| Finish RTRM Constr & Calibr | ✔ | 9235 | May 9, 1995 | May 9, 1995 | May 9, 1995 | May 9, 1995 | 0 | 0 | 0 | 0.00 | 0.00 | Milestone |
| Perform RTRM Lab Demo | ✔ | 9225 | May 9, 1995 | Aug 3, 1995 | May 9, 1995 | Aug 3, 1995 | 60 | 0 | 0 | 0.00 | 0.00 | Task |
| Start FY95 Report | ✔ | 9215 | Aug 3, 1995 | Aug 3, 1995 | Aug 3, 1995 | Aug 3, 1995 | 0 | 0 | 0 | 0.00 | 0.00 | Milestone |
| Complete RTRM Lab Demo | | 9230 | Aug 3, 1995 | Aug 3, 1995 | Sep 8, 1995 | Sep 8, 1995 | 0 | 25 | 0 | 0.00 | 0.00 | Milestone |
| Prepare FY95 Report | ✔ | 9210 | Aug 3, 1995 | Sep 8, 1995 | Aug 3, 1995 | Sep 8, 1995 | 25 | 0 | 0 | 0.00 | 0.00 | Task |
| Finish FY95 Report | ✔ | 9250 | Sep 8, 1995 | Sep 8, 1995 | Sep 8, 1995 | Sep 8, 1995 | 0 | 0 | 0 | 0.00 | 0.00 | Milestone |

# TECHNICAL DESIGN DOCUMENT

## REAL-TIME RADIOACTIVITY MONITORING OF SURFACE WATER IN THE RFETS INDUSTRIAL AREA

### INTRODUCTION:

This document describes, after literature search and vendor contacts, selection of a most suitable system for the continuous surface water real-time radioactivity monitoring (RTRM) project. This is in harmony with the main consideration criteria for the system.

The major considerations in selecting a suitable RTRM for an on-line continuous monitoring system for Pu/Am/U were;

(1) a rugged RTRM system within the limited project cost,

(2) most suitable and off-the-shelf available system, and

(3) infer alpha activity through monitoring for alpha or gamma.

In addition, monitored surface water data will be transmitted over an existing telemetry network, and will be used to establish early warning methods to support both the D&D and environmental restoration (ER) activities.

### SELECTION OF RADIOACTIVITY WATER MONITORING SYSTEM:

The Environmental Protection Agency (EPA) established regulations for radionuclides in drinking water under Safe Drinking Water Act of 1974. EPA has specified a "maximum concentration level" or MCL value for alpha and beta/gamma emitters. At present, the gross alpha activity MCL has been set at 15 pCi/L ($1.5 \times 10^{-14}$ Ci/mL).

There are several techniques used for monitoring water concentration of alpha activity. They fall under two major categories; on-line and off-line or laboratory techniques. The on-line monitors include Mylar-covered ZnS(Ag) or scintillating plastic (NE102 or BC400) and silicon detectors. In laboratory techniques, water samples are collected, concentrated, and dried



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on planchets, and then counted using scintillation, gas-flow, or semiconductor technology to determine the level of activity.

In the case of laboratory techniques, for a few minute count time and about one liter sample, scintillation techniques can achieve sensitivities of about $10^{-12}$ Ci/mL (1 pCi/mL) and low-background semiconductor/gas-flow counters can achieve $10^{-14}$ to $10^{-13}$ Ci/mL (0.01 to 0.1 pCi/mL). These techniques, however, take long time (weeks) to produce activity data for routine samples.

The short range of alpha particles (4.18 MeV alpha have a range of 0.0009" or 23 $\mu$m in water) is the main problem in monitoring alpha activity in water. Moreover, once the alpha particle has penetrated the layer of water, part of its energy is further absorbed in the entrance window of the scintillator. The maximum depth that an alpha particle can be detected is a function of the angle the alpha makes with the plane normal to the scintillator. And as this angle increases, the alpha particle must traverse larger distances in order to reach the scintillator and produce a detectable signal. These problems are largely resolved in a detector system described below.

<u>Suggested Detector</u>:

A very rugged ZnS(Ag) detector, TUFF130AWM-H, manufactured by RIS Corp., sees 10 cpm for every 3.27 x $10^{-11}$ Ci/mL (or 1 cpm for every 3.27 pCi/mL) for Pu-239 when used with Ludlum 2000 with almost zero background. This detector has virtually no entrance window, and it has achieved the best sensitivity level for an on-line active water monitor. Since ZnS(Ag) has a very low cross-section for beta and gamma interactions, these will not give much of a problem. With appropriate discriminator settings, unwanted pulses produced by beta/gamma interactions can easily be eliminated.

The sensitivity of the water monitor is a function of the area of scintillator (or other detection medium) and the amount of material the alpha must penetrate in order to reach the scintillator. Therefore, there are two ways to improve the sensitivity of the water monitor - increase the area or decrease the window thickness. The window thickness of this detector is practically zero, and currently, the area of a TUFF130AWM-H is 130 $cm^2$ and has a sensitivity of $10^{-12}$ Ci/mL (about two decades larger than EPA release limit of $10^{-14}$ Ci/mL for gross alpha). However, since the background is almost zero, and if the counts are performed for 30 minutes, it will improve the probe sensitivity by more than one order of magnitude.

If a practical preconcentration method for the industrial area IM/IRA fluids becomes commercially available, then even better sensitivity may be achieved. However, the cost of such preconcentration is not included in this cost estimation.

An extremely thin chemical coating on the exposed surface of the sensor reduces algae and chemical build-up on the sensor. The sensor can withstand up to 100 psi at a 4 to 6 safety factor (approx. 20 gal/min). The sample chamber is manufactured with 304L stainless steel; it is corrosive resistant, can withstands continuous flow without metal deterioration, and survives most hostile environments.

**COST ESTIMATION:**

Description: Project Management

This activity provides funding for controlling and overseeing the project.

Basis of Estimate:

Labor: Cost Center 203 - 50 hours @ $78.61

Total Hours: 50
Non-labor Dollars: None
Total Dollars: $3,930

Description: Establishment of RTRM Requirements

This activity will establish requirements for the surface water real-time radioactivity monitoring (RTRM) project. Task includes literature search, vendor contacts, and confirming the requirements for the project with the customer.

Basis of Estimate:

Labor: Cost Center 257 - 40 hours @ $99.85
Cost Center 203 - 20 hours @ $78.61

Total Hours: 60
Non-labor Dollars: None
Total Dollars: $5,566

Description: Preparation of Project Plan

This activity is an overview of the RTRM project with main tasks outlined and costs summarized.

Basis of Estimate:

Labor: Cost Center 257 - 25 hours @ $99.85
Cost Center 203 - 15 hours @ $78.61

Total Hours: 40
Non-labor Dollars: None
Total Dollars: $3,675

Description: Preparation of Technical Design Document

This activity includes preparing a technical design document describing details of the project and measurement instrumentation used in the project.

Basis of Estimate:

Labor: Cost Center 257 - 90 hours @ $99.85
Cost Center 203 - 10 hours @ $78.61

Total Hours: 100
Non-labor Dollars: None
Total Dollars: $9,773

Description: Procure and design RTRM Components

This activity provides funding for specifying and procuring vendor supplied equipment, and designing the project components for in house fabrication. It also includes the cost for fabricating the radiation standards for calibrating the system.

Basis of Estimate:

Labor: Cost Center 257 - 80 hours @ $99.85

Non-labor: Cost Center 203

| | |
|---|---|
| Two TUFF130AWM-H Probe | $25,990 |
| Associated Electronics | $ 2,910 |
| Measurement Chamber(s), standards, and other developmental equipment fabrication. | $21,100 |

Travel: Cost Center 203
One trip for three persons to SRS and ORNL @ $1,500 each.

Total Hours: 80
Non-labor Dollars: $50,000
Total Dollars: $62,488

Description: Fabrication and Laboratory Evaluation of RTRM System

This activity provides funding for assembling the water monitoring system and collecting preliminary data.

Basis of Estimate:

Labor: Cost Center 257 - 300 hours @ $99.85

Total Hours: 300
Non-labor Dollars: None
Total Dollars: $ 29,955

Description: Laboratory Demonstration of RTRM System

This activity provides funding for demonstrating a working RTRM system and performing refinements/modifications as needed.

Basis of Estimate:

Labor: Cost Center 257 - 200 hours @ $99.85

Total Hours: 200
Non-labor Dollars: None
Total Dollars: $19,970

Description: Preparing FY95 Interim Report on RTRM System

This activity provides funding for preparing FY95 interim report on RTRM System describing the system, its measurement limits, and conclusions.

Basis of Estimate:

Labor: Cost Center 257 - 100 hours @ $99.85

Total Hours: 100
Non-labor Dollars: None
Total Dollars: $9,985

**GRAND TOTAL FOR FY-95:**

**Total Hours: 930**
**Non-labor Dollars: $50,000**
**Total Dollars: $145,342.**

# APPENDIX C

## Industrial Area Interim Measure/Interim Remedial Action Surface-Water Monitoring Technical Design Document

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# INDUSTRIAL AREA INTERIM MEASURE / INTERIM REMEDIAL ACTION SURFACE-WATER MONITORING TECHNICAL DESIGN DOCUMENT

U.S. DEPARTMENT OF ENERGY

Rocky Flats Environmental Technology Site

Golden, Colorado


PREPARED BY EG&G ROCKY FLATS, INCORPORATED

ENVIRONMENTAL PROTECTION MANAGEMENT DEPARTMENT

SURFACE WATER BRANCH


December 1994

Revision 1

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## Table of Figures and Tables

## 1. PURPOSE

This technical design document describes the surface-water monitoring program for implementation of the Industrial Area Interim Measure / Interim Remedial Action (IA IM/IRA) at the Rocky Flats Environmental Technology Site (RFETS) in accordance with the IA IM/IRA Decision Document (IM/IRA, DD) (EG&G, 1994a). The IA IM/IRA, DD provides a framework for action in preparation of decontamination and decommissioning (D&D) of the RFETS. This framework includes implementation of a high-resolution surface-water monitoring program that targets stormwater runoff monitoring and monitoring of selected potential point sources of surface water pollution that are uncharacterized to date. This monitoring program is intended to provide:

1. Data for determining baseline water-quality and quantity prior to D&D activities and for establishing warning limits for surface-water constituents in D&D areas; and

2. Provide a network for surface-water monitoring during D&D activities to act as an early warning system for potential releases of materials from D&D areas.

This technical design document was prepared prior to the actual approval of the IM/IRA, DD by the U.S. Environmental Protection Agency (USEPA), the Colorado Department of Public Health and the Environment (CDPHE), and the U.S. Department of Energy in order to achieve milestones proposed in the IM/IRA, DD on schedule. Therefore, this document is a "living" document which will be updated based on future developments in the final IM/IRA,DD.

## 2. SCOPE

This technical design document includes: a description of the RFETS IA IM/IRA surface-water monitoring program and monitoring network; identification of applicable regulatory and quality assurance requirements, a description of the organizational and functional responsibilities of various agencies and companies involved with the program; and a schedule for program activities and deliverables.

## 3. SETTING

The RFETS is a government owned, contractor operated facility in the U.S. Department of Energy (DOE) nuclear weapons complex, located in Golden, Colorado. The site is owned by the DOE, managed by the DOE Rocky Flats Field Office (DOE,RFFO), and operated by EG&G Rocky Flats, Inc. (EG&G). The IA IM/IRA is managed by the EG&G Environmental Restoration Management Department, Remediation Programs Division, and the surface-water monitoring portion of the IA IM/IRA is implemented by EG&G Environmental Protection Management Department, Surface Water Branch.

This program will be implemented in and immediately adjacent to the RFETS 398-acre Industrial Area (IA) which is, and continues to be, home to a variety of industrial uses associated with the fabrication of components for nuclear weapons, nuclear material handling and storage, and waste management. The IA is approximately 74% impervious drainage area consisting of buildings, pavement, and fill. Surface-water monitoring activities described herein will primarily occur in drainage ditches, storm sewers, and building sump / footing drain pipes in and immediately adjacent to the RFETS IA.

Figure 1 shows the locations of the IA IM/IRA surface-water monitoring stations. Monitoring of surface water in natural channels will occur at stations GS10 and SW093 for the IA IM/IRA.

Each surface-water monitoring station will be equipped with a continuously recording flow meter linked to an automatic surface-water sampler. The equipment will be programmed to obtain samples from stormwater runoff or, in the case of a dry ditch, whenever water is detected in the channel. Table 1 lists the equipment that will be used at each location for monitoring flow and collecting water-quality samples as well as the chemical parameter data that will be collected at each station.

## 4. TECHNICAL DESIGN DOCUMENT COMPLIANCE

This program will be implemented in response to requirements under the DOE / USEPA Interagency Agreement for clean-up of the RFETS under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the Superfund Amendments Reauthorization Act and in accordance with the requirements of the RFETS IA IM/IRA, DD. All work performed under this project will be controlled by EG&G Standard Operating Procedures (SOPs) and standard analytical methods. This section identifies and addresses the regulatory and quality assurance (QA) requirements that are applicable to the IA IM/IRA surface-water monitoring program.

### 4.1 Regulatory Requirements

The IA IM/IRA surface-water monitoring program will be conducted to satisfy the following regulatory requirements.

- CERCLA and DOE / USEPA Interagency Agreement
- DOE Orders 5400.1 and 5400.5

### 4.2 Quality Assurance Requirements

Quality assurance requirements contained in the EPM Quality Assurance Program Description (QAPD) are applicable to the work activities described herein (EG&G, 1991). The QAPD requires project-specific QA requirements to be addressed in project technical design documents.

All work shall comply with EG&G SOPs. Log books, as well as U.S. Geological Survey Discharge Measurement Note forms, shall be kept to document equipment installation,

**Table 1. IA IM/IRA Surface Water Monitoring Data Collection and Water Sampling**

| | | | CONTINUOUS DATA COLLECTION | | | WATER QUALITY SAMPLING | | |
|---|---|---|---|---|---|---|---|---|
| GAGING STATION | LOCATION | PATHWAY | INDICATOR PARAMETERS | FLOW MEASUREMENT | TELEMETRY INTERFACE | RFEDS EVENT-RELATED ANALYTE LIST | ORGANICS | FREQUENCY |
| SW998 | West Diversion Ditch north of 130 Area | 4 | None | 9.5" Parshall flume; Continuous Flow/Stage | Sutron Satellite Telemetry | YES | EPA Method 524.2 Complete | Storm Events; Not to exceed 1 sample per month (12 samples per year) |
| SW093 | N. Walnut Creek at 6' cmp north of Solar Ponds | 3 | None | 36" rectangular weir w/o end contractions; Continuous Flow/Stage | Geomation (in place); Sutron Satellite Telemetry | YES | EPA Method 524.2 Complete | Storm Events; Not to exceed 1 sample per month (12 samples per year) |
| SW091 | Small Tributary to N. Walnut Creek ENE of Solar Ponds | 6 | None | 1.0' H-flume; Continuous Flow/Stage | None | YES | EPA Method 524.2 Complete | Storm Events; Not to exceed 1 sample per month (12 samples per year) |
| SW023/ GS10 | S. Walnut Creek 50' Upstream of B-1 Bypass | 2 | None | 9.5" Parshall flume; Continuous Flow/Stage | Sutron Satellite Telemetry | YES | EPA Method 524.2 Complete | Storm Events; Not to exceed 1 sample per month (12 samples per year) |

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| | | | CONTINUOUS DATA COLLECTION | | | WATER QUALITY SAMPLING | | |
|---|---|---|---|---|---|---|---|---|
| GAGING STATION | LOCATION | PATHWAY | INDICATOR PARAMETERS | FLOW MEASUREMENT | TELEMETRY INTERFACE | RFEDS EVENT-RELATED ANALYTE LIST | ORGANICS | FREQUENCY |
| GS24 | CMP Draining Impervious Area South of 881 | 5 | None | 1' H-flume; Continuous Flow/Stage | None | YES | EPA Method 524.2 Complete | Storm Events; Not to exceed 1 sample per month (12 samples per year) |
| GS25 | CMP Draining Areas South and East of 881 | 5 | None | 1' H-flume; Continuous Flow/Stage | None | YES | EPA Method 524.2 Complete | Storm Events; Not to exceed 1 sample per month (12 samples per year) |
| Subbasin Verification Sites | Outfalls for Specific Subbasins Depending on Location of D&D Operations | NA | pH; Electrical Conductivity | Primary Devices depend on location and drainage area; Continuous Flow/Stage | Geomation System: Flow; Indicator Parameters | To be determined by COPC analysis for specific D&D locations during implementation phase of project | To be determined by COPC analysis | Storm Events: Not to exceed 1 sample per month; Samples with indicator parameters in exceedence of predetermined limits are all analyzed |

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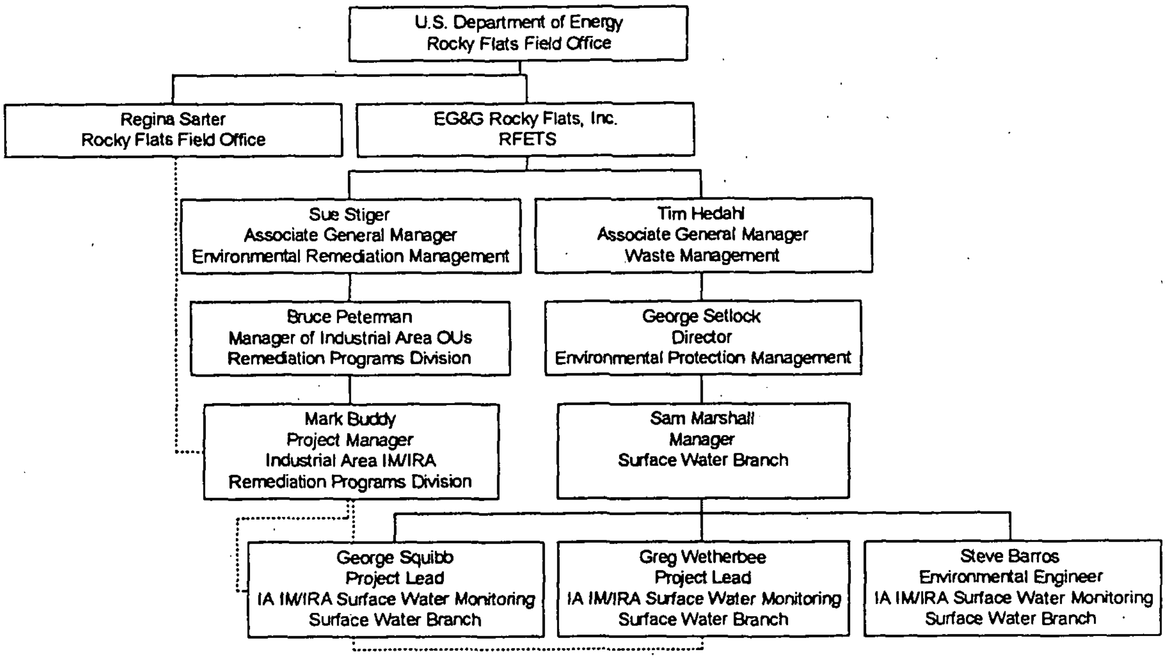
# 5. ORGANIZATIONAL RESPONSIBILITIES AND PERSONNEL QUALIFICATIONS

## 5.1 Organizational Responsibilities

The structure of the organizations which are directly involved with the implementation of the work described herein are shown in Figure 2. Planning, implementation, and operation of the IA IM/IRA surface-water monitoring network is the responsibility of the Surface Water Branch. Surface Water Branch shall install, calibrate, and operate each monitoring station, including routine, weekly inspection and maintenance of every station. Sample collection and sampler maintenance shall be the responsibility of the Surface Water Branch.

**Figure 2. IA IM/IRA Surface Water Monitoring Organizational Chart**




Other EG&G departments will provide support to the program through their assigned functional responsibilities. The Remediation Programs Division (RPD) of ERM is responsible for funding and providing project management functions for this activity. Regulatory and programmatic guidance also are provided by RPD.

The Ecology and Watershed Management Branch of EPM will be responsible for species and habitat surveys for compliance with the Threatened and Endangered Species Act, Section 404 of the Clean Water Act and Executive Order 11990 for protection of wetlands, the Migratory Bird Treaty Act, and other laws applicable to potential ecological impacts from the installation of the monitoring equipment.

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The Environmental Operations Management Division (EOM) of ERM along with EG&G Construction Management, Industrial Hygiene, Radiological Engineering, and other support organizations, will provide support for excavation (a.k.a. Soil Disturbance) permits, Hazardous Waste Determination, and Readiness Assessment Review.

Subcontracted personnel provided by Jacobs Engineering Group (JEG) shall provide technical support for IA IM/IRA surface-water monitoring tasks. JEG shall provide support for monitoring station installation and sample preparation, shipment, and tracking. Surface Water Branch personnel shall provide JEG with the surface-water samples in 15-Liter carboy containers. JEG shall split this composite sample into discrete bottles with appropriate preservatives for shipment to laboratories for chemical analysis.

### 5.2 Personnel Qualifications and Training

The qualifications for the Project Leads include at least a B.S. degree in Civil/Environmental Engineering, Chemistry, Geology, Biology, or other related discipline plus a minimum of two years of professional experience in surface-water data collection, compilation, and analysis and/or project management. Training requirements include, at a minimum, current 40-hour OSHA training in compliance with 40CFR 1910.120, knowledge of EG&G SOPs, on-the-job training in stream gaging, water sampling, and the use of ISCO monitoring equipment, personal computer (PC) training/experience, and familiarity with regulatory documents and requirements.

Technical personnel providing assistance to the Project Leads shall have at least five years experience in environmental project work, including at least one year of field data collection experience. Training requirements for technical personnel include a basic understanding of the contents of this technical design document, training in applicable EG&G SOPs, 40-hour OSHA training, PC proficiency, and on-the-job training in the use of automatic data and surface-water sample collection systems.

All subcontracted field and laboratory personnel shall be familiar with EG&G SOPs and laboratory procedures applicable to their assigned tasks. They shall also meet any qualification and additional training requirements listed by the procedures that they use.

## 6. IA IM/IRA SURFACE-WATER MONITORING TASKS

All tasks completed for this activity shall be in compliance with the requirements of the IA IM/IRA, DD. The IA IM/IRA, DD specifies monitoring locations, data requirements for each location, and the administrative framework for using the data to make management decisions about D&D actions at the RFETS. Generally, there are three fundamental tasks associated with the implementation of the IA IM/IRA surface-water monitoring program. These are: 1) Monitoring station installation; 2) Data collection (monitoring station operation and maintenance); and 3) Data analysis and reporting.

## 6.1 Monitoring Station Installation

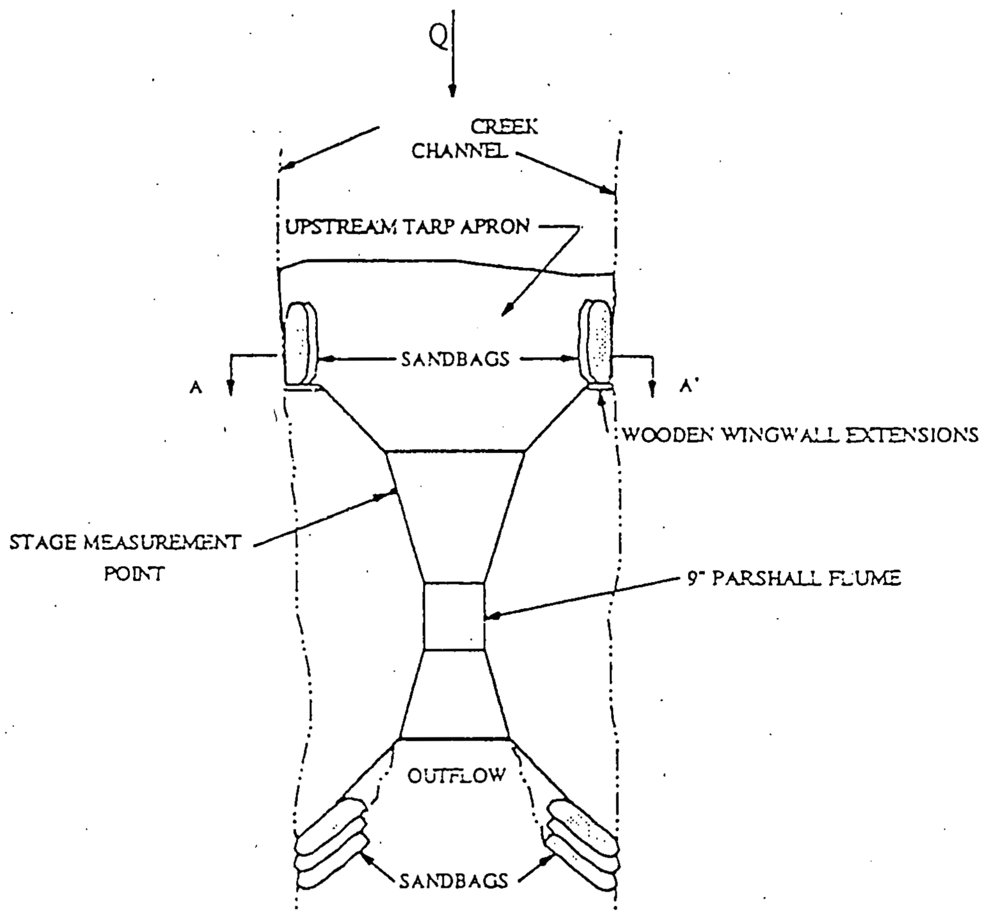
### 6.1.1 Task Description

Surface Water Branch will install and/or upgrade instrumentation at the monitoring locations shown in Figure 1. Each station will consist of an ISCO Model 4230 Bubbler Flow Meter linked to an ISCO Model 3700 Portable sampler and an ISCO Model 6000 VOC sampler. A Geomation Model 2370 remote measurement and control radio-telemetry system will be used to transmit data in real time from stations installed closest to D&D areas to the Surface Water Branch and other potential receivers of the telemetered data. Power for the instrumentation will be provided by AC line power where available, but this is anticipated to be rare. Therefore, a Remote Power solar/DC power supply will power most, and possibly all, of the stations. Each station will have a primary flow-control structure. The flow-control structures may be existing culverts or concrete stormwater conveyance structures. However, in most cases, H-flumes or weirs will be purchased and/or fabricated for installation in either natural stream channels, ditches, or fastened to existing concrete or metal stormwater conveyance structures.

The installation task might involve minor hand excavation of channel banks and beds for installation of the flow-control structure in ditches or natural channels. For fastening of flow-control structures to existing structures, a rotary hammer or carbide-tip steel drill might be used to drill holes in the structures for attachment of the flow-control structure by either lag screws or expansion bolts. Alternatively, some flow-control structures might be installed by simply using tarps and sandbags to secure a flume in a channel and ensure that all runoff enters the flume. Each station will require a different application of flow-control structure and means for securing the structure in place. For excavation applications, an areal impact of no more than 15 square feet is expected per site. An example of a flow-control structure installation is shown in Figure 3.

**Figure 3. Schematic Diagram of a Typical Parshall Flume Installation**

NOT TO SCALE

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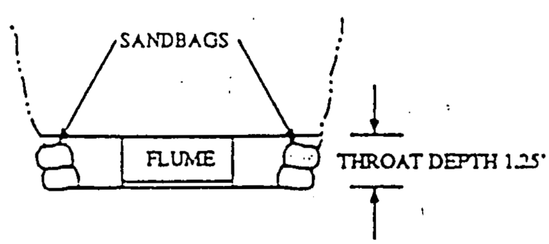



After the flow-control structure is in place, it will be instrumented with the ISCO equipment. Then the ISCO equipment is programmed and calibrated to complete the installation.

### 6.1.2 Types of Data Collected

Field notes documenting the specifications for each monitoring station shall be recorded in a field log book. Instrument programming information and calibration records shall also be recorded in a field log book.

### 6.1.3 Records Produced

Quality Assurance records produced as part of this activity are:

1. Field log books
2. Photographs of station installations

### 6.1.4 Applicable Instructions and Methods

All flow-control structures and ISCO, and Remote Power equipment shall be installed per the manufacturer's instructions. Programming and calibration of the ISCO equipment shall be done in accordance with the manufacturer's instructions which also are reproduced in EG&G SOPs 5-21000-OPS-SW: SW10 and SW11.

### 6.1.5 Required Resources

Two qualified people (Section 5) will be required to install each monitoring station. Common hand tools, power tools, and supplies will be required to install the flow-control structures. Examples of these are:

rubber tarp material
1/2" neoprene rubber gasket material
50 lb - 70 lb sand bags
1/4" to 3/8" nuts, bolts, and washers
1/4" plywood
2"X2" lumber
4"X4" lumber
hose clamps
plastic wire ties
plumber's putty
hand level
tape measure
saw
cordless drill
screw drivers
wrenches / pliers
shovels
pick-ax

Installation of the ISCO equipment usually is accomplished using screwdrivers, wrenches, and pliers with little need for other equipment.

### 6.1.6 Data Quality

Data collected pertaining to the installation of the monitoring stations must be of sufficient quality to document how the flow-control structure is installed so as to validate the flow-record quality. Written notes documenting the specifications for each flow-control structures, including dimensions, and photographs showing the completed monitoring station are required to document that the monitoring station record is scientifically defensible.

### 6.1.7 Work Product Objectives

The product of this task is a network of fully functional automated surface-water monitoring stations. Fifteen stations currently (11/94) are scheduled for installation in Fiscal Year 1995. These include instrumentation of five NPDES stormwater outfalls, eight outfalls to the South Interceptor Ditch on and around the Building 881 Hillside, and two stations located around the first D&D area which is to be determined.

### 6.1.8 Acceptable Criteria

The monitoring stations must be properly installed and fully functional in time for data collection during the spring of 1995 in order to comply with the IA IM/IRA, DD schedule. Flow control structures must be level, plumb, and leak free. Instrumentation must be powered, calibrated, and recording representative data. Sampler intakes must be positioned such that representative samples are collected at each station. The equipment must be secured to prevent damage to the equipment and the potential for tampering.

### 6.1.9 Applicable Software

The ISCO monitoring equipment operates on its own software which is called "Flowlink." The most current version of Flowlink is Version 3.9, but Surface Water Branch prefers Version 2.0 which will be used to program the station instrumentation. This software will operate on a 486 lap-top computer which will be used to program the instrumentation and download data from the dataloggers.

## 6.2 Data Collection

### 6.2.1 Task Description

The monitoring stations will begin collecting data immediately upon installation. The flow meters shall log stream stage continuously, storing data points on five-minute intervals. The automatic samplers shall be programmed to collect 15-Liter composite samples on a flow-paced basis. Therefore, each station will be set up to collect a discrete volume of water per a specified number of cubic feet of water measured by the flow meter. The flow pacing will vary from station to station based on the volume and discharge (rate) that is anticipated for average storm depths and intensities.

After a storm, each station will be visited to determine whether or not a sample has been collected. If a sampler has a full sample, the data from the flow meter will be recorded and downloaded electronically to a lap-top PC to obtain the sampling interval information. Then the sample shall be removed from the sampler, capped, and taken to JEG for sample preparation, shipment, and tracking. The sampler will be replenished with a clean 15-Liter carboy and reset to sample the next storm event. Two carboys will be dedicated to each station to minimize cross-contamination problems for sample waters. One carboy will be clean and waiting for deployment while the other will reside in the sampler. Carboys shall be kept in either T891I or T891R depending on space limitations in these trailers.

Routine weekly inspection and maintenance of the monitoring stations is required to detect leaks or damage to the flow-control structures, troubleshoot problems with the instrumentation, and provide calibration notes for subsequent computation of the discharge records for each station. At least once a month, the flow data shall be downloaded from the flow meters to a lap-top PC. These data shall then be transferred to a PC in T893A for computation of the discharge records using EXCEL Version 5.0.

At the D&D subbasin stations (to be determined), continuous records of pH and conductivity are required by the IA IM/IRA, DD. The ISCO flow meters can accommodate a pH probe for continuous pH record collection, however the conductivity instrumentation has not yet been selected. Surface Water Branch expects to use either Hydrolab or Campbell Scientific instrumentation to continuously log conductivity. Both the pH and conductivity meters shall be calibrated weekly, and the pH probes shall be kept wet using carboys of water located on the bank next to the station. The carboys shall be connected to instream sumps where the probes are placed. Stormwater flow will flush the sumps to allow for measurement of pH and conductivity of the runoff.

### 6.2.2 Types of Data

The types of data that the stations shall collect are as follows.

1. Continuous record of stream stage (later converted to discharge) on five-minute intervals.

2. Stormwater runoff sample record, indicating date and time of the collection of individual samples that are composited in the 15-Liter carboy.

3. Routine, weekly inspection notes on USGS Discharge Measurement Note forms and in log books.

4. Continuous record of pH and electrical conductivity for D&D subbasin locations.

5. After sample analyses are returned from the laboratories, data retrievals from the Rocky Flats Environmental Data System (RFEDS) shall be obtained on magnetic media for subsequent analysis and reporting. The analytical methods that shall be used for the IA IM/IRA, DD surface-water monitoring program are shown in Table 2.

**Table 2. RFETS Event-Related Analyte List, Preservation and Containerization Requirements, and Laboratory Assignments.**

| Class of Analytes | Volume Required for Analysis | Preservative | Container | Contract Laboratory |
|---|---|---|---|---|
| Total Metals ICPMS | 1 Liter | Nitric Acid to pH<2.0 | Polyethylene | ACZ |
| Dissolved Metals ICPMS | 1 Liter | Nitric Acid to pH<2.0 | Polyethylene | ACZ |
| Total Radionuclides (Pu, U, Am) Alpha Spectrometry | 7.5 Liters | Nitric Acid to pH<2.0 | Polyethylene | TMA NORCAL |
| Radiation Screen | 125 mL | None | Polyethylene | Weston Lionville |
| Water-Quality Parameters (Anions, Alkalinity, pH, TSS, TDS) | 1 Liter | Chill to 4°C | | Weston Gulf Coast |
| Nitrate/Nitrite as N Colorimetrically | 500 mL | Sulfuric Acid | Polyethylene | Weston Gulf Coast |
| Total Phosphorous Colorimetrically | 500 mL | Chill to 4°C | Polyethylene | Building 881 General Labs |
| Volatile Organic Analytes Method 524.2 | 120 mL | Chill to 4° HCl to pH<2.0 | Glass, 40 mL VOA Vial | Weston Gulf Coast |
| Semi-Volatile Organic Analytes Method 625 | 2 Liters1 | Chill to 4°C | Amber Glass | Weston Gulf Coast |
| Pesticides/PCBs CLP Method | 350 mL | Chill to 4°C | Amber Glass | Weston Gulf Coast |
| Total Organic Carbon | 120 mL | Sulfuric Acid | Amber Glass | Weston Gulf Coast |

### 6.2.3 Records Produced

Tangible records produced from the data-collection task shall be kept by Surface Water Branch in building T893A. These records include the following items.

1. Field log books
2. USGS Discharge Measurement Note forms
3. Paper strip charts from flow meters

4. Electronic data from the flow meters on magnetic media
5. Chain of Custody forms for sample shipment/disposition
6. Sample Collection forms (RFEDS)

### 6.2.4 Applicable Instructions and Methods

Data collection procedures are outlined in EG&G SOPs and instrumentation manufacturer instruction manuals. The applicable EG&G SOPs are as follows.

Manual 5-21000-OPS-SW

1. SW.02 - Field Parameter Measurement
2. SW.03 - Surface Water Sampling
3. SW.04 - Discharge Measurement
4. SW.05 - Base Laboratory Work
5. SW.10 - Event-Related Surface-Water Sampling
6. SW.11 - Operation and Maintenance of Stream-Gaging and Sampling Stations

Manual 5-21000-OPS-FO

1. FO.03 - General Equipment Decontamination
2. FO.06 - Handling of Personal Protective Equipment
3. FO.07 - Handling of Decontamination Water and Wash Water
4. FO.11 - Field Communications
5. FO.13 - Containerization, Preserving, Handling, and Shipping of Soil and Water Samples
6. FO.14 - Field Data Management
7. FO.19 - Base Laboratory Work

### 6.2.5 Required Resources

Three qualified field personnel shall be available within Surface Water Branch to operate and maintain the monitoring stations. Two people are needed to perform routine, weekly inspection of the stations. One additional person is needed to be an alternate station inspector and to provide support for sampling events which require a significant amount of work to pull samples from the samplers and replace the samplers with clean carboys. Subcontracted personnel are required to containerize and ship samples obtained from the 15-Liter carboys and enter the sample collection information into the RFEDS sample tracking system (DATACAP).

The use of government vehicles and two-way radios will be required for routine, weekly station inspection and maintenance. Vehicles and two-way communication equipment shall be provided by the ERM OPS Division.

Equipment requirements for the data-collection task are as follows.

1. ISCO equipment supplies: desiccant cartridges, strip chart paper, fuses
2. 486 Lap-top PC with Flowlink software and interrogator cable
3. Field log books, pens, pencils, markers
4. 2, 15-Liter Nalgene carboys (with lids) per station
5. Personal protective equipment (latex gloves, steel-toe shoes, coveralls)
6. Voltage meter
7. Chain-Of-Custody forms
8. Labels / labeling tape
9. Tape measure
10. Hand level
11. 3.5-inch diskettes (magnetic media for electronic format data)
12. 486 PC with EXCEL 5.0 software and a laser printer
13. Pressurizing water sprayer
14. Deionized water
15. pH buffers and conductivity standards for meter calibration.
16. Field pH and conductivity meters.
17. Office and base laboratory space.

Many of the above items are already available, such as office and base laboratory space, computers, software, and office supplies. Only field equipment and supplies will need to be procured for this program.

### 6.2.6 Data Quality

Data collected for this task must be of sufficient quality to withstand scrutiny by the DOE, USEPA, and CDPHE in their evaluation of the data to make decisions about the impacts of D&D activities. The data must be scientifically defensible and consistent with sound scientific principles and standards for data collection.

The analytical methods that will be used to obtain data for chemical constituent concentration or activity are shown in Table 2. These methods imply detection limits which are of the appropriate degree of sensitivity to determine if the presence and concentration of constituents in the surface water samples are indicative of influence of D&D activities on water quality. All metals, radionuclide, and organic analyte data will be validated by an independent data validator through the EG&G Sample Management Office unless the users of the data specifically request in writing to Surface Water Branch to forego validation.

At least 10% of the chemical analysis data shall be quality control samples to ascertain reproducibility of analytical results and evaluate the potential for cross-contamination between samples collected by the automatic samplers and composited in the dedicated carboy containers. Duplicate samples shall be submitted to ascertain field and analytical reproducibility. Equipment rinseate samples will be analyzed to evaluate potential cross-contamination.

### 6.2.7 Work Product Objectives

The work products resulting from this task are as follows.

1. Continuous record (electronic and hard copy) of stream stage and discharge.

2. Continuous record of pH and electrical conductivity at D&D subbasin stations.

3. Calibration / inspection notes for monitoring equipment

4. Chemical analysis data for water-quality constituents (Table 2)

### 6.2.8 Acceptable Criteria

Surface Water Branch personnel and RPD personnel will evaluate the data to determine the reliability of the data. Criteria applicable to acceptable data collected under this task are as follows.

1. Less than 5% missing continuous record of stream stage and/or discharge, pH, and electrical conductivity.

2. Less than 5% missing calibration and inspection notes for computation of stream stage and/or discharge, pH, and electrical conductivity.

3. Analytical data should be "non-rejected" data as determined by the data validator, and hold-times form sample analysis should not be exceeded.

4. There should be no question about the meaning of recorded field notes.

### 6.2.9 Applicable Software

As mentioned previously, there are software requirements for the data-collection task. ISCO Flowlink, Version 2.0 will be needed for operation of the ISCO equipment. EXCEL 5.0 is needed to perform data-reduction tasks for the stream stage / discharge data. Statistical Analysis System (SAS) software also is required to work with the chemical analysis data obtained from RFEDS.

## 6.3 Data Analysis and Reporting

### 6.3.1 Task Description

The data analysis and reporting task involves data compilation, evaluation, and reporting of the data collected in the data collection task. This task is completed in the office on personal computers. The data will be evaluated for quality assurance and consistency, and then characteristics of the data will be statistically quantified using SAS. The statistical analysis results shall be published in a report by Surface Water Branch, and the report shall be submitted to the RPD project manager approximately 20 months after commencement of the monitoring activities. This schedule is consistent with the requirements of the IA IM/IRA, DD. An expedited D&D schedule shall force earlier publication of a report to accommodate commencement of D&D.

Currently (11/94) the format of the data reports has not been determined. There are several ways in which the data may be reported. The IA IM/IRA, DD requires specific tasks for computing warning and action concentrations or activities for individual chemical constituents. This will require performing statistical analysis of the data collected for each chemical constituent at each monitoring location to determine characteristics of the distribution of the chemical constituent data. The mean and standard deviation of the data distributions for chemical constituents will be used to arrive at warning and action limits for water discharged from D&D areas, where one standard deviation from the mean will be a warning limit and two standard deviations from the mean will be an action limit.

### 6.3.2 Types of Data

A description of the data collected for this task can be found in section 6.2.2 of this technical design document. These data will be the subject of interpretive reports that will be written by Surface Water Branch and delivered to RPD. The report(s) shall at least contain the following material.

1. Continuous record of daily mean discharge for each station

2. Continuous record of daily mean pH and electrical conductivity for each D&D subbasin station

3. Summary statistics for each chemical constituent, including computation of warning and action limits for each station.

4. Summary of significant findings and conclusions drawn from evaluation of the data.

### 6.3.3 Records Produced

The records produced for this task include reports containing the items listed in section 6.2.2 of this report. Letters of transmittal of the reports to RPD also are records produced by this task.

### 6.3.4 Applicable Instructions and Methods

There are not citeable materials that proceduralize or otherwise document instructions or methods for this task.

### 6.3.5 Required Resources

At least one Environmental Engineer or Environmental Scientist is required to produce the required reports for this activity. A 486 PC equipped with SAS, EXCEL 5.0, and a word processor (e.g. Microsoft Word) is needed for this task.

### 6.3.6 Data Quality

Data quality will be evaluated as part of the data analysis and reporting task. Duplicate chemical analysis data will be compared to determine reproducibility of analytical results. Equipment rinseate samples will be examined to determine whether or not cross-contamination from automatic sampling equipment is occurring. Cation / anion balancing will be done to ascertain the quality of metals analyses and anion analyses. Examination of the data for outlier data values will also be done using box and whisker plots.

The stream discharge data will be evaluated to provide descriptive qualification of the discharge record quality. For example, if flow-control device leakage is observed, an estimation of the relative quantity of flow not measured will be provided.

### 6.3.7 Work Product Objectives

The work products for this task are reports that summarize the data and provide warning and action limits for D&D. The report(s) shall at least contain the following material.

1. Continuous record of daily mean discharge for each station

2. Continuous record of daily mean pH and electrical conductivity for each D&D subbasin station

3. Summary statistics for each chemical constituent, including computation of warning and action limits for each station.

4. Summary of significant findings and conclusions drawn from evaluation of the data.

### 6.3.8 Acceptable Criteria

The reports shall be scientifically defensible, understandable to a non-technical audience, and have a professional appearance. The reports shall contain all available data. The reports shall be prepared in a timely fashion so as to meet IM/IRA, DD schedules and/or future D&D schedules.

### 6.3.9 Applicable Software

As mentioned earlier, a 486 PC equipped with SAS, EXCEL 5.0, and a word processor (e.g. Microsoft Word) is needed for this task.

## 7. ENVIRONMENTAL SAFETY AND HEALTH COMPLIANCE

Compliance with either an existing or new Health and Safety Plan will be required to perform the work in the field. An appropriate existing Health and Safety Plan currently (11/94) has not been identified. However, several existing Health and Safety Plans cover similar work at RFETS, including a plan that the USGS uses for their stream gaging work at RFETS. An existing plan will be modified to suit IA IM/IRA needs if an existing plan doesn't already accommodate those needs.

## 8. SCHEDULE

The schedule of tasks/activities for this program are shown in a Gantt chart in Figure 4 and in a PERT chart in Figure 5. Implementation of the IA IM/IRA, DD surface-water monitoring requirements began on October 3, 1994. The current (11/94) schedule for installation of the monitoring stations calls for completion of all installations by March 15, 1995. This early completion date is desired to facilitate spring record collection at stations that rarely flow at any other time of the year. Commencement of monitoring is scheduled for March 30, 1995. This schedule is somewhat tentative because at the time of this writing, the IA IM/IRA, DD is not yet approved by the regulatory agencies.

**Figure 4. Industrial Area IM/IRA Surface Water Monitoring Program Schedule: Gantt Chart.**

Industrial Area Interim Measure / Interim Remedial Action Surface Water Monitoring Program Schedule

| ID | Name | Duration |
|---|---|---|
| 1 | Evaluate Equipment Needs | 25d |
| 2 | Complete Draft Work Plan | 30d |
| 3 | Deliver Procurement Packages | 14d |
| 4 | Submit Land Use/Excavation Re | 5d |
| 5 | Complete NEPA Ck List | 5d |
| 6 | Coordinate T&E Migr. Birds, Etc. | 5d |
| 7 | Install ISCO Samplers at Tier I S | 4d |
| 8 | Install flow-control devices | 20d |
| 9 | Instrument flow-cntrl devices | 16d |
| 10 | Complete Station Installations | 0d |
| 11 | Commence Monitoring at Statio | 0d |

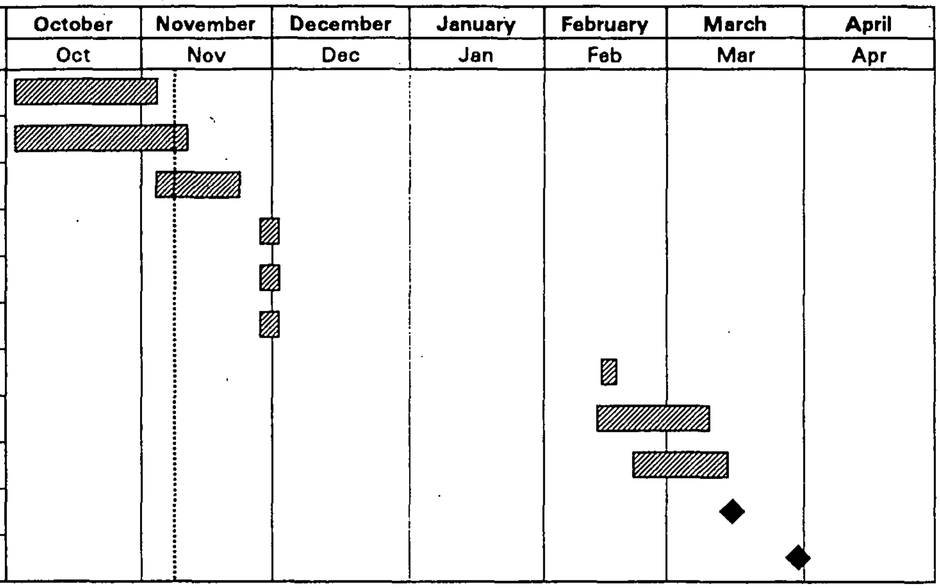
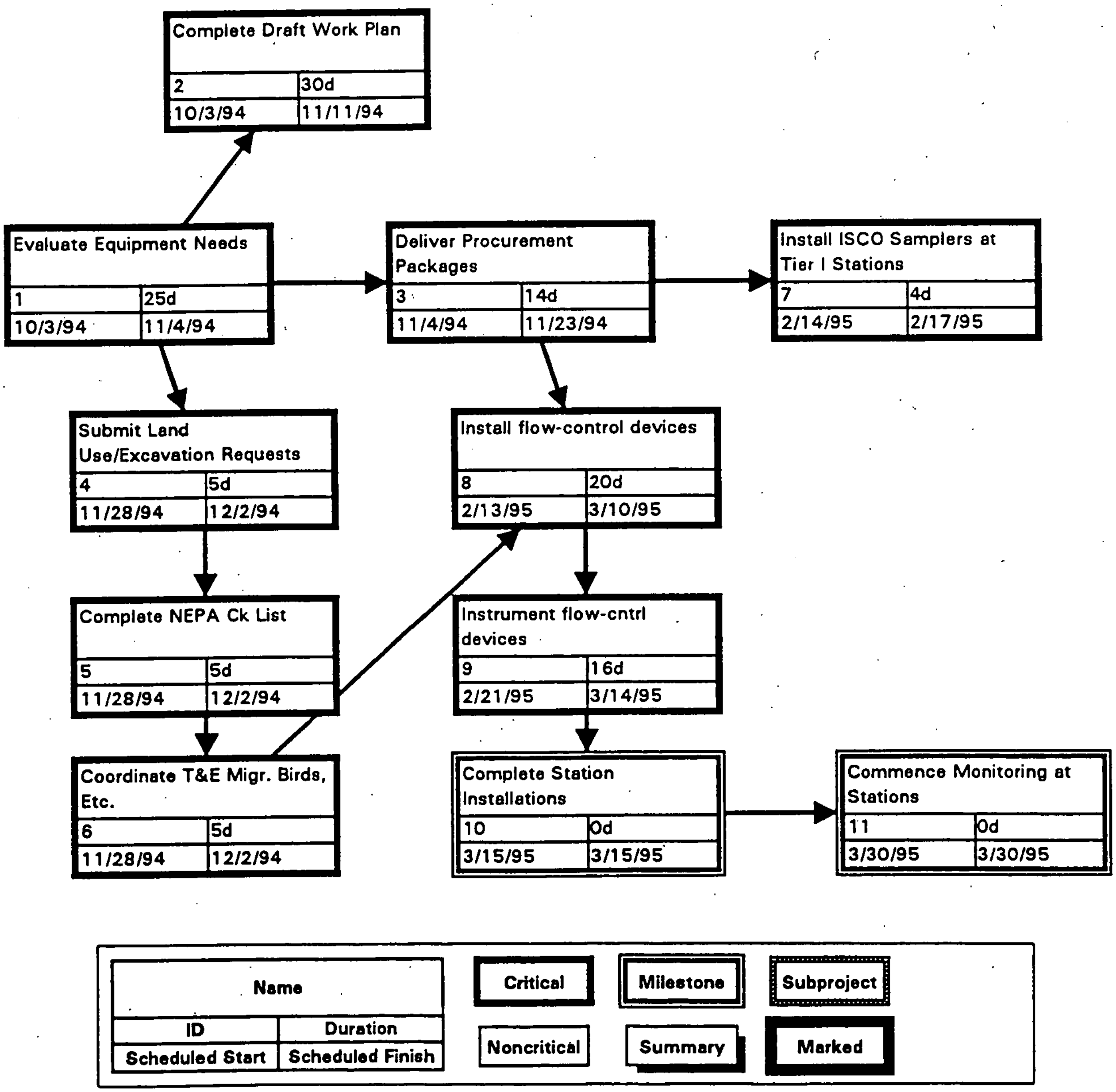


**Figure 5. Industrial Area IM/IRA Surface Water Monitoring Program Schedule: PERT Chart.**

Industrial Area Interim Measure / Interim Remedial Action Surface Water Monitoring Program Schedule

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## 9. FUNDING

Funding for this program comes from two sources within the RPD and Surface Water Branch organizations. Work Package number 12196 is funded by Budget and Reporting Code (B&R Code) EW2010302 by DOE Environmental Restoration. Work Package 12196 funds the installation of the monitoring stations, including procurement of all equipment. Work Package number 61207 is funded by B&R Code EW7030000 by DOE Transition Management. Work Package 61207 will ultimately take over the responsibility for the operation and maintenance of the monitoring stations as an activity for the transition of the RFETS facility to a D&D mode of operation. Fiscal Year 1995 funding for the program is approximately $500,000.

## 10. REFERENCES

EG&G, 1994a, "Industrial Area Interim Measure / Interim Remedial Action Decision Document," EG&G Rocky Flats, Inc., Rocky Flats Environmental Technology Site, Golden, Colorado, Section 5.

EG&G, 1992, "Rocky Flats Plant Drainage and Flood Control Master Plan, Woman Creek, Walnut Creek, Upper Big Dry Creek, and Rock Creek, " EG&G Rocky Flats, Inc., Rocky Flats Plant, Golden, Colorado, Section VII.

EG&G, 1991, "Quality Assurance Program Planning," EG&G manual number 1-50000-ADM-02.01, EG&G Rocky Flats, Inc., Rocky Flats Plant, Golden, Colorado.

# APPENDIX D

## Constituents of Potential Concern Screening Methodology Lists

h:\wp\flats\im-ira\imp-plan\appendix

## APPENDIX D1

List of Monitored Chemicals at RFETS

EG&G ROCKY FLATS

# ROCKY FLATS PLANT SITE-WIDE

# QUALITY ASSURANCE PROJECT PLAN

# FOR CERCLA REMEDIAL INVESTIGATIONS/FEASIBILITY STUDIES

# AND

# RCRA FACILITY INVESTIGATIONS/CORRECTIVE MEASURES STUDIES

# ACTIVITIES

ENVIRONMENTAL RESTORATION PROGRAM

ROCKY FLATS PLANT

GOLDEN, COLORADO



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TITLE: APPENDIX B

Approved By:

Director, Environmental Management 5 7 91



# APPENDIX B

## Table B1: Analytical Methods, Detection Limits, and Data Quality Objectives

# ANALYTICAL METHODS, DETECTION LIMITS, AND DATA QUALITY OBJECTIVES

| Analyte | Method | SW | GW | BOREHOLE | SED | Required Detection Limits Water | Required Detection Limits Soil/Sed. | Precision Objective | Accuracy Objective |
|---|---|---|---|---|---|---|---|---|---|
| **INDICATORS** | | | | | | | | | |
| Total Suspended Solids | EPA 160.2* | x** | | | | 10 mg/l | NA | 20%RPD | 80-120% LCS Recovery |
| Total Dissolved Solids | EPA 160.1* | x* | x* | | | 5 mg/l | NA | 20%RPD | 80-120% LCS Recovery |
| pH | EPA 150.1* | x** | x* | | | 0.1 pH units | 0.1 pH units | NA | ±0.05 pH units |
| **INORGANICS** | | | | | | | | | |
| Target Analyte List - Metals | | x* | x* | x | x | | | WATER/SOIL | WATER/SOIL |
| Aluminum | EPA CLP SOW* | | | | | 200 ug/l* | 40 mg/Kg* | ** | *** |
| Antimony | EPA CLP SOW* | | | | | 60 | 12 | | |
| Arsenic (GFAA) | EPA CLP SOW* | | | | | 10 | 2 | | |
| Barium | EPA CLP SOW* | | | | | 200 | 40 | | |
| Beryllium | EPA CLP SOW* | | | | | 5 | 1.0 | | |
| Cadmium | EPA CLP SOW* | | | | | 5 | 1.0 | | |
| Calcium | EPA CLP SOW* | | | | | 5000 | 2000 | | |
| Chromium | EPA CLP SOW* | | | | | 10 | 2.0 | | |
| Cobalt | EPA CLP SOW* | | | | | 50 | 10 | | |
| Copper | EPA CLP SOW* | | | | | 25 | 5.0 | | |
| Cyanide | EPA 335.3 (modified for CLP)** | | | | | 5 | 10 | | |
| Iron | EPA CLP SOW* | | | | | 100 ug/l* | 20 mg/Kg* | | |
| Lead (GFAA) | EPA CLP SOW* | | | | | 3 | 1.0 | | |
| Magnesium | EPA CLP SOW* | | | | | 5000 | 2000 | | |
| Manganese | EPA CLP SOW* | | | | | 15 | 3.0 | | |
| Mercury (CVAA) | EPA CLP SOW* | | | | | 0.2 | 0.2 | | |
| Nickel | EPA CLP SOW* | | | | | 40 | 8.0 | | |
| Potassium | EPA CLP SOW* | | | | | 5000 | 2000 | | |
| Selenium (GFAA) | EPA CLP SOW* | | | | | 5 | 1.0 | | |
| Silver | EPA CLP SOW* | | | | | 10 | 2.0 | | |
| Sodium | EPA CLP SOW* | | | | | 5000 | 2000 | | |
| Thallium (GFAA) | EPA CLP SOW* | | | | | 10 | 2.0 | | |
| Vanadium | EPA CLP SOW* | | | | | 50 | 10 | | |
| Zinc | EPA CLP SOW* | | | | | 20 | 4.0 | | |



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# ANALYTICAL METHODS, DETECTION LIMITS, AND DATA QUALITY OBJECTIVES

| Analysis | Method | SW | GW | BOREHOLE | SED | Required Detection Limits Water | Soil/Sed | Precision Objective | Accuracy Objective |
|---|---|---|---|---|---|---|---|---|---|
| Other Metals | | X* | X* | X | X | | | WATER/SOIL | WATER/SOIL |
| Molybdenum | EPA CLP SOW (ICAP) | | | | | 8 ug/l | 40 mg/Kg* | ** | *** |
| Cesium | EPA CLP SOW | | | | | 1000 | 200 | | |
| Strontium | EPA CLP SOW | | | | | 200 | 40 | | |
| Lithium | EPA CLP SOW | | | | | 100 | 20 | | |
| Tin | EPA CLP SOW | | | | | 200 | 40 | | |
| Other Inorganics | | | | | | | | | |
| Percent Solids | EPA 160.3* | | | X | X | NA | 10 mg | NA | NA |
| Sulfide | EPA 376.1* | | | X | X | NA | 4 ug/g | Same as metals | Same as metals |
| ANIONS | | | | | | | | Water/Soil | Water/Soil |
| Carbonate | EPA 310.1* | X* | X* | | | 10 mg/l | NA | Same as metals | Same as metals |
| Bicarbonate | EPA 310.1* | X* | X* | | | 10 mg/l | NA | | |
| Chloride | EPA 325.2* | X* | X* | | | 5 mg/l | NA | | |
| Sulfate | EPA 375.6* | X* | X* | | | 5 mg/l | NA | | |
| Nitrate as N | EPA 353.2* or 353.3* | X* | X* | | | 1 mg/l | NA | | |
| Fluoride | EPA 340.2* | X* | X* | | | 5 mg/l | NA | | |
| Oil and Grease | EPA 413.2* | X* | | | | 5 mg/l | NA | ** | *** |
| *Total Petroleum Hydrocarbons | EPA 418.1* | | | X | X | NA | 10 mg/Kg | NA/40 | NA/80 120 |
| Target Compound List - Volatiles | EPA CLP SOW | X* | X* | X | X | | | WATER/SOIL | WATER/SOIL |
| Chloromethane | EPA CLP SOW | | | | | 10 ug/l | 10 ug/Kg (low)* | ** | *** |
| Bromomethane | EPA CLP SOW | | | | | 10 | 10 | | |
| Vinyl Chloride | EPA CLP SOW | | | | | 10 | 10 | | |
| Chloroethane | EPA CLP SOW | | | | | 10 | 10 | | |
| Methylene Chloride | EPA CLP SOW | | | | | 5 | 5 | | |
| Acetone | EPA CLP SOW | | | | | 10 | 10 | | |
| Carbon Disulfide | EPA CLP SOW | | | | | 5 | 5 | | |
| 1,1-Dichloroethene | EPA CLP SOW | | | | | 5 | 5 | | |
| 1,1-Dichloroethane | EPA CLP SOW | | | | | 5 ug/l | 5 ug/Kg(low)* | | |
| Total 1,2-Dichloroethene | EPA CLP SOW | | | | | 5 | 5 | | |

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# ANALYTICAL METHODS, DETECTION LIMITS, AND DATA QUALITY OBJECTIVES

| Analyte | Method | SW | GW | BOREHOLE | SED | Required Detection Limits Water | Required Detection Limits Soil/Sed. | Precision Objective | Accuracy Objective |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | WATER/SOIL | WATER/SOIL |
| **Target Compound List - Volatiles (continued)** | | X* | X* | X | X | | | | |
| | | | | | | | | ** | *** |
| Chloroform | EPA CLP SOW | | | | | 5 | 5 | | |
| 1,2-Dichloroethane | EPA CLP SOW | | | | | 1 | 5 | | |
| 2-Butanone | EPA CLP SOW | | | | | 10 | 10 | | |
| 1,1,1-Trichoroethane | EPA CLP SOW | | | | | 5 | 5 | | |
| Carbon Tetrachloride | EPA CLP SOW | | | | | 5 | 5 | | |
| Vinyl Acetate | EPA CLP SOW | | | | | 10 | 10 | | |
| Bromodichloromethane | EPA CLP SOW | | | | | 5 | 5 | | |
| 1,2-Dichloropropane | EPA CLP SOW | | | | | 5 | 5 | | |
| cis-1,3-Dichloropropene | EPA CLP SOW | | | | | 5 | 5 | | |
| Trichloroethene | EPA CLP SOW | | | | | 5 | 5 | | |
| Dibromochloromethane | EPA CLP SOW | | | | | 5 | 5 | | |
| 1,1,2-Trichloroethane | EPA CLP SOW | | | | | 5 | 5 | | |
| Benzene | EPA CLP SOW | | | | | 5 | 5 | | |
| trans-1,2-Dichloropropene | EPA CLP SOW | | | | | 5 | 5 | | |
| Bromoform | EPA CLP SOW | | | | | 5 | 5 | | |
| 4-Methyl-2-pentanone | EPA CLP SOW | | | | | 10 | 10 | | |
| 2-Hexanone | EPA CLP SOW | | | | | 10 | 10 | | |
| Tetrachloroethene | EPA CLP SOW | | | | | 5 | 5 | | |
| Toluene | EPA CLP SOW | | | | | 5 | 5 | | |
| 1,1,2,2-Tetrachoroethane | EPA CLP SOW | | | | | 5 | 5 | | |
| Chlorobenzene | EPA CLP SOW | | | | | 5 | 5 | | |
| Ethyl Benzene | EPA CLP SOW | | | | | 5 | 5 | | |
| Styrene | EPA CLP SOW | | | | | 5 | 5 | | |
| Total Xylenes | EPA CLP SOW | | | | | 5 | 5 | | |
| | | | | | | | | WATER/SOIL | WATER/SOIL |
| **Target Compound List - Semi-Volatiles** | | | X* | X | X | | | | |
| | | | | | | | | ** | *** |
| Phenol | EPA CLP SOW | | | | | 10 ug/l | 330 ug/Kg' | | |
| bis(2-Chloroethyl)ether | EPA CLP SOW | | | | | 10 | 330 | | |
| 2-Chlorophenol | EPA CLP SOW | | | | | 10 | 330 | | |
| 1,3-Dichlorobenzene | EPA CLP SOW | | | | | 10 | 330 | | |
| 1,4-Dichlorobenzene | EPA CLP SOW | | | | | 10 | 330 | | |
| Benzyl Alcohol | EPA CLP SOW | | | | | 10 | 330 | | |
| 1,2-Dichlorobenzene | EPA CLP SOW | | | | | 10 | 330 | | |
| 2-Methylphenol | EPA CLP SOW | | | | | 10 | 330 | | |
| bis(2-Chloroisopropyl)ether | EPA CLP SOW | | | | | 10 | 330 | | |
| 4-Methylphenol | EPA CLP SOW | | | | | 10 | 330 | | |
| N-Nitroso-Dipropylamine | EPA CLP SOW | | | | | 10 | 330 | | |

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# ANALYTICAL METHODS, DETECTION LIMITS, AND DATA QUALITY OBJECTIVES

| Analysis | Method | SW | GW | RCRA/HSWA | SED | Required Detection Limits Water | Required Detection Limits Soil/Sed | Precision Objective | Accuracy Objective |
|---|---|---|---|---|---|---|---|---|---|
| Target Compound List - Semi-Volatiles (continued) | | | X* | X | X | | | WATER/SOIL | WATER/SOIL |
| Hexachloroethane | EPA CLP SOW | | | | | 10 | 330 | ** | *** |
| Nitrobenzene | EPA CLP SOW | | | | | 10 | 330 | | |
| Isophorone | EPA CLP SOW | | | | | 10 | 330 | | |
| 2-Nitrophenol | EPA CLP SOW | | | | | 10 | 330 | | |
| 2,4-Dimethylphenol | EPA CLP SOW | | | | | 10 | 330 | | |
| Benzoic Acid | EPA CLP SOW | | | | | 50 | 1600 | | |
| bis(2-Choroethoxy)methane | EPA CLP SOW | | | | | 10 | 330 | | |
| 2,4-Dichlorophenol | EPA CLP SOW | | | | | 10 | 330 | | |
| 1,2,4-Trichlorobenzene | EPA CLP SOW | | | | | 10 | 330 | | |
| Naphthalene | EPA CLP SOW | | | | | 10 | 330 | | |
| 4-Chloroaniline | EPA CLP SOW | | | | | 10 | 330 | | |
| Hexachlorobutadiene | EPA CLP SOW | | | | | 10 | 330 | | |
| 4-Chloro-3-methylphenol | EPA CLP SOW | | | | | 10 | 330 | | |
| 2-Methylnaphthalene | EPA CLP SOW | | | | | 10 | 330 | | |
| Hexachlorocyclopentadiene | EPA CLP SOW | | | | | 10 ug/l | 330 ug/Kg' | | |
| 2,4,6-Trichlorophenol | EPA CLP SOW | | | | | 10 | 330 | | |
| 2,4,5-Trichlorophenol | EPA CLP SOW | | | | | 50 | 1600 | | |
| 2-Chloronaphthalene | EPA CLP SOW | | | | | 10 | 330 | | |
| 2-Nitroaniline | EPA CLP SOW | | | | | 50 | 1600 | | |
| Dimethylphthalate | EPA CLP SOW | | | | | 10 | 330 | | |
| Acenaphthylene | EPA CLP SOW | | | | | 10 | 330 | | |
| 2,6-Dinitrotoluene | EPA CLP SOW | | | | | 10 | 330 | | |
| 3-Nitroaniline | EPA CLP SOW | | | | | 50 | 1600 | | |
| Acenaphthene | EPA CLP SOW | | | | | 10 | 330 | | |
| 2,4-Dinitrophenol | EPA CLP SOW | | | | | 50 | 1600 | | |
| 4-Nitrophenol | EPA CLP SOW | | | | | 50 | 1600 | | |
| Dibenzofuran | EPA CLP SOW | | | | | 10 | 330 | | |
| 2,4-Dinitrotoluene | EPA CLP SOW | | | | | 10 | 330 | | |
| Diethylphthalate | EPA CLP SOW | | | | | 10 | 330 | | |
| 4-Chlorophenol Phenyl ether | EPA CLP SOW | | | | | 10 | 330 | | |
| Fluorene | EPA CLP SOW | | | | | 10 | 330 | | |
| 4-Nitroaniline | EPA CLP SOW | | | | | 50 | 1600 | | |
| 4,6-Dinitro-2-methylphenol | EPA CLP SOW | | | | | 50 | 1600 | | |
| N-nitrosodiphenylamine | EPA CLP SOW | | | | | 10 | 330 | | |
| 4-Bromophenyl Phenyl ether | EPA CLP SOW | | | | | 10 | 330 | | |
| Hexachlorobenzene | EPA CLP SOW | | | | | 10 | 330 | | |
| Pentachlorophenol | EPA CLP SOW | | | | | 50 | 1600 | | |
| Phenanthrene | EPA CLP SOW | | | | | 10 | 330 | | |
| Anthracene | EPA CLP SOW | | | | | 10 ug/l | 330 ug/Kg' | | |

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# ANALYTICAL METHODS, DETECTION LIMITS, AND DATA QUALITY OBJECTIVES

| Analyte | Method | SW | GW | BOREHOLE | SED | Required Detection Limits Water | Soil/Sed | Precision Objective | Accuracy Objective |
|---|---|---|---|---|---|---|---|---|---|
| Target Compound List - Semi-Volatiles (continued) | | | X* | X | X | | | WATER/SOIL | WATER/SOIL |
| Di-n-butylphthalate | EPA CLP SOW | | | | | 10 | 330 | ** | *** |
| Fluoranthene | EPA CLP SOW | | | | | 10 | 330 | | |
| Pyrene | EPA CLP SOW | | | | | 10 | 330 | | |
| Butyl Benzylphthalate | EPA CLP SOW | | | | | 10 | 330 | | |
| 3,3'-Dichlorobenzidine | EPA CLP SOW | | | | | 20 | 660 | | |
| Benzo(a)anthracene | EPA CLP SOW | | | | | 10 | 330 | | |
| Chrysene | EPA CLP SOW | | | | | 10 | 330 | | |
| bis(2-ethylhexyl)phthalate | EPA CLP SOW | | | | | 10 | 330 | | |
| Di-n-octyl Phthalate | EPA CLP SOW | | | | | 10 | 330 | | |
| Benzo(b)fluoranthene | EPA CLP SOW | | | | | 10 | 330 | | |
| Benzo(k)fluoranthene | EPA CLP SOW | | | | | 10 | 330 | | |
| Benzo(a)pyrene | EPA CLP SOW | | | | | 10 | 330 | | |
| Indeno(1,2,3-cd)pyrene | EPA CLP SOW | | | | | 10 | 330 | | |
| Dibenz(a,h)anthracene | EPA CLP SOW | | | | | 10 | 330 | | |
| Benzo(g,h,i)perylene | EPA CLP SOW | | | | | 10 | 330 | | |
| Target Compound List - Pesticides/PCBs | | | X* | X | X | | | WATER/SOIL (%RPD) | WATER/SOIL (% Recovery) |
| alpha-BHC | EPA CLP SOW | | | | | 0.05 ug/L | 8.0 ug/Kg* | ** | *** |
| beta-BHC | EPA CLP SOW | | | | | 0.05 | 8.0 | | |
| delta-BHC | EPA CLP SOW | | | | | 0.05 | 8.0 | | |
| gamma-BHC (Lindane) | EPA CLP SOW | | | | | 0.05 | 8.0 | | |
| Heptachlor | EPA CLP SOW | | | | | 0.05 | 8.0 | | |
| Aldrin | EPA CLP SOW | | | | | 0.05 ug/L | 8.0 ug/Kg* | | |
| Heptachlor Epoxide | EPA CLP SOW | | | | | 0.05 | 8.0 | | |
| Endosulfan I | EPA CLP SOW | | | | | 0.05 | 8.0 | | |
| Dieldrin | EPA CLP SOW | | | | | 0.10 | 16.0 | | |
| 4,4'-DDE | EPA CLP SOW | | | | | 0.10 | 16.0 | | |
| Endrin | EPA CLP SOW | | | | | 0.10 | 16.0 | | |
| Endosulfan II | EPA CLP SOW | | | | | 0.10 | 16.0 | | |
| 4,4'-DDD | EPA CLP SOW | | | | | 0.10 | 16.0 | | |
| Endosulfan Sulfate | EPA CLP SOW | | | | | 0.10 | 16.0 | | |
| 4,4'-DDT | EPA CLP SOW | | | | | 0.10 | 16.0 | | |
| Methoxychlor | EPA CLP SOW | | | | | 0.5 | 80.0 | | |
| Endrin Ketone | EPA CLP SOW | | | | | 0.10 | 16.0 | | |
| alpha-Chlordane | EPA CLP SOW | | | | | 0.5 | 80.0 | | |
| gamma-Chlordane | EPA CLP SOW | | | | | 0.5 | 80.0 | | |
| Toxaphene | EPA CLP SOW | | | | | 1.0 | 160.0 | | |

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# ANALYTICAL METHODS, DETECTION LIMITS, AND DATA QUALITY OBJECTIVES

| Analysis | Method | SW | GW | BOREHOLE | SED | Required Detection Limits Water | Soil/Sed. | Precision Objective | Accuracy Objective |
|---|---|---|---|---|---|---|---|---|---|
| Target Compound List - Pesticides/PCBs (continued) | | | x** | x | x | | | WATER/SOIL (%RPD) | WATER/SOIL (% Recovery) |
| AROCLOR-1016 | EPA CLP SOW | | | | | 0.5 | 80.0 | | |
| AROCLOR-1221 | EPA CLP SOW | | | | | 0.5 | 80.0 | | |
| AROCLOR-1232 | EPA CLP SOW | | | | | 0.5 | 80.0 | | |
| AROCLOR-1242 | EPA CLP SOW | | | | | 0.5 | 80.0 | | |
| AROCLOR-1248 | EPA CLP SOW | | | | | 0.5 | 80.0 | | |
| AROCLOR-1254 | EPA CLP SOW | | | | | 1.0 | 160.0 | | |
| AROCLOR-1260 | EPA CLP SOW | | | | | 1.0 | 160.0 | (Replicate Analyses) | (Laboratory Control Sample) |
| **RADIONUCLIDES** | | | | | | | | | |
| Gross Alpha | f,g,h,i,k,l,m,n,s | x*,** | x* | x | x | 2 pCi/l | 4 pCi/g | ** | *** |
| Gross Beta | f,g,h,i,k,l,m,n,s | x*,** | x* | x | x | 4 pCi/l | 10 pCi/g | | |
| Uranium 233+234 | f,h,i,m,l,n,s | x*,** | x* | x | x | 0.6 pCi/l | 0.3 pCi/g | | |
| Uranium 235,238 | f,h,i,l,m,n,s | x*,** | x* | x | x | 0.6 pCi/l | 0.3 pCi/g | | |
| Americium 241 | i,l,p,q,s | x*,** | x* | x | x | 0.01 pCi/l | 0.02 pCi/g | | |
| Plutonium 239+240 | i,l,o,p,s | x*,** | x* | x | x | 0.01 pCi/l | 0.03 pCi/g | | |
| Tritium | f,g,h,i,l,m,s | x** | x** | x | x | 400 pCi/l | 400 pCi/l | | |
| Strontium 89,90 | f,h,i,l,m,s | | | x | x | NA | 1 pCi/g | | |
| Strontium 90 only | f,h,i,l,m,s | x*,** | x* | | | 1 pCi/l | NA | | |
| Cesium 137 | h,i,l,m | x*,** | x* | x | x | 1 pCi/l | 0.1 pCi/g | | |
| Radium 226 | f,g,h,i,l,m*,s | x*,** | x* | | | 0.5 pCi/l | 0.5 pCi/g | | |
| Radium 228 | f,g,h,i,l,m*,s | x*,** | x* | | | 1 pCi/l | 0.5 pCi/g | | |
| **SURFICIAL SOIL SAMPLING PARAMETERS** | | | | | | | | | |
| Total Organic Carbon | ALPHA 5310* | | | | | | 1 mg/kg | ** | *** |
| Carbonate | EPA 310.1* | | | | | | 2 mg/kg | | |
| pH | EPA 150.1* | | | | | | 0.1 pH units | | |
| Specific Conductance | EPA 120.1* | | | | | | 2.5 umho/cm | | |
| Plutonium 239+240 | i,l,o,p,s | | | | | | 0.03 pCi/g | | |
| Americium 241 | i,l,p,q,s | | | | | | 0.01 pCi/g | | |
| Uranium 233,234,235,238 | f,h,i,l,m,n,s | | | | | | 0.04 pCi/g | | |



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# ANALYTICAL METHODS, DETECTION LIMITS, AND DATA QUALITY OBJECTIVES

| Analyte | Method | SW | GW | BOREHOLE | SED | Readability Objective | Accuracy |
|---|---|---|---|---|---|---|---|
| **FIELD PARAMETERS** | | | | | | | |
| pH | 1 | X | X | | | ± 0.1 pH unit | ± 0.2 pH units |
| Specific Conductance | 1 | X | X | | | 2.5 µmho/cm²<br>25 µmho/cm²<br>250 µmho/cm² | ± 2.5% max. error at 500, 5000, 50000 µmhos/cm plus probe;<br>± 3.0% max error at 250, 2500, and 25000 plus probe accuracy of ± 2.0%. |
| Temperature | 1 | X | X | | | ± 0.1°C | ± 1.0°C |
| Dissolved Oxygen | 1 | X | | | | ± 0.1 mg/l | ± 10% |

# ANALYTICAL METHODS, DETECTION LIMITS, AND DATA QUALITY OBJECTIVES

* For samples collected from IHSSs 102 and 105 only (BH01,BH02,BH03,BH04,BH05,BH06,BH07,BH08 (MW33),BH09,BH15,BH16,BH17,BH18,MW01,MW02,MW03,MW33 (BH08)).
** Precision objective = control limits specified in referenced method and/or Data Validation Guidelines.
*** Accuracy objective = control limits specified in referenced method (in GRRASP for radionuclides).
F = Filtered
U = Unfiltered

1. Measured in the field in accordance with instrument manufacturer's instructions. The instruments to be used are specified in Section 12.
2. Medium soil/sediment required detection limits for pesticide/PCB TCL compounds are 15 times the individual low soil/sediment required detection limit.
3. Detection limits listed for soil/sediment are based on wet weight. The detection limits calculated by the laboratory for soil/sediment, calculated on dry weight basis as required by the contract, will be higher.
4. Higher detection limits may only be used in the following circumstance: If the sample concentration exceeds five times the detection limit of the instrument or method in use, the value may be reported even though the instrument or method detection limit may not equal the required detection limit. This is illustrated in the example below:

   For lead:

   Method in use - ICP
   Instrument Detection Limit (IDL) - 40
   Sample Concentration - 220
   Required Detection Limit (RDL) - 3

   The value of 220 may be reported even though the instrument detection limit is greater than the RDL.

   Note: The specified detection limits are based on a pure water matrix. The detection limits for samples may be considerably higher depending on the sample matrix.
5. If gross alpha > 5 pCi/L, analyze for Radium 226; if Radium 226 > 3 pCi/L, analyze for Radium 228.
6. The detection limits presented were calculated using the formula in N.R.C. Regulatory Guide 4.14, Appendix Lower Limit of Detection, pg. 21, and follow:

$$LLD = \frac{4.66\,(BKG/BKG\ DUR)^{1/2}}{(2.22)(Eff)(CR)(SR)(e^{-\lambda t})(Aliq)}$$

$$MDA = \frac{4.66\,(BKG/Sample\ DUR)^{1/2}}{(2.22)(Eff)(CR)(SR)e^{-\lambda t}(Aliq)}$$

Where:

LLD = Lower Limit of Detection in pCi per sample unit.
BKG = Instrument Background in counts per minute (CPM).
Eff = Counting efficiency in cpm/disintegration per minute (dpm).
CR = Fractional radiochemical yield.
SR = Fractional radiochemical yield of a known solution.
$\lambda$ = The radioactive decay constant for the particular radionuclide.
t = The elapsed time between sample collection and counting.
Aliq = Sample volume.
BKG DUR = Background count duration in minutes.

MDA = Minimum Detectable Activity in pCi per sample unit
BKG = same as for LLD
Eff = same as for LLD
CR = same as for LLD
SR = same as for LLD
$\lambda$ = same as for LLD
t = same as for LLD
Aliq = same as for LLD
Sample DUR = sample count duration in minutes

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# ANALYTICAL METHODS, DETECTION LIMITS, AND DATA QUALITY OBJECTIVES

7. On 500 umho/cm range.
8. On 5000 umho/cm range.
9. On 50000 umho/cm range.
a. U.S. Environmental Protection Agency Contract Laboratory Program Statement of Work for Inorganics Analysis, Multi-Media, Multi-Concentration, 7/88 (or latest version).
b. U.S. Environmental Protection Agency Contract Laboratory Program Statement of Work for Inorganics Analysis, Multi-Media, Multi-Concentration, 7/88 (or latest version). The specific method to be utilized is at the laboratory's discretion provided it meets the specified detection limit.
c. U.S. Environmental Protection Agency Contract Laboratory Program Statement of Work for Organic Analysis, Multi-Media, Multi-Concentration, 2/88 (or latest version).
d. Methods are from "Methods for Chemical Analysis of Water and Wastes," U.S. Environmental Protection Agency, 1983, unless otherwise indicated.
e. Methods are from "Test Methods for Evaluation of Solid Waste, Physical/Chemical Methods," (SW-846, 3rd Ed.), U.S. Environmental Protection Agency.
f. U.S. Environmental Protection Agency, 1979, Radiochemical Analytical Procedures for Analysis of Environmental Samples, Report No. EMSL-LV-0539-1, Las Vegas, NV, U.S. Environmental Protection Agency.
g. American Public Health Association, American Water Works Association, Water Pollution Control Federation, 1985. Standard Methods for the Examination of Water and Wastewater, 16th ed., Washington, D.C., Am. Public Health Association.
h. U.S. Environmental Protection Agency, 1976. Interim Radiochemical Methodology for Drinking Water, Report No. EPA-600/4-75-008. Cincinnati U.S. Environmental Protection Agency.
i. Harley, J.H., ed., 1975, ASL Procedures Manual, HASL-300; Washington, D.C., U.S. Energy Research and Development Administration.
j. U.S. EPA, 1982. "Methods for Organic Analysis of Municipal and Industrial Waste Water," US EPA 600/4-82-057.
k. "Handbook of Analytical Procedures," USAEC, Grand Junction Lab. 1970, page 196.
l. "Prescribed Procedures for Measurement of Radioactivity in Drinking Water," EPA-600/4-80-032, August 1980, Environmental Monitoring and Support Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Cincinnati, Ohio 45268.
m. "Methods for Determination of Radioactive Substances in Water and Fluvial Sediments," U.S.G.S. Book 5, Chapter A5, 1977.
n. "Acid Dissolution Method for the Analysis of Plutonium in Soil," EPA-600/7-79-081, March 1979, U.S. EPA Environmental Monitoring and Support Laboratory, Las Vegas, Nevada, 1979.
o. "Procedures for the Isolation of Alpha Spectrometrically Pure Plutonium, Uranium, and Americium," by E.H. Essington and B.J. Drennon, Los Alamos National Laboratory, a private communication.
p. "Isolation of Americium from Urine Samples," Rocky Flats Plant, Health, Safety, and Environmental Laboratories.
q. "Radioactivity in Drinking Water," EPA 570/9-81-002.
r. If the sample or duplicate result is <5 x IDL, then the control limit is ± IDL.
s. U.S. EPA, 1987. "Eastern Environmental Radiation Facility Radiochemistry Procedures Manual," EPA-520/5-84-006.

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# APPENDIX D2

## List of Chemicals Specific to Building 889

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# List of Chemicals Specific to Building 889

| CHEMICAL | AMOUNT/CONC. |
|---|---|
| **Based on Known Emission Rates** | |
| Freon 113 | 4.12 lb/yr |
| Lead | 0.219 lb/yr |
| Mercury | 0.98 lb/yr |
| Methylene Chloride | 2.063 lb/yr |
| TCA | 5.44 lb/yr |
| VOCs | 14.004 lb/yr |
| Acetone | 1.14 lb/yr |
| Alcohol | 1.47 lb/yr |
| Ethyl Alcohol | 0.054 lb/yr |
| Ethylene glycol | 0.054 lb/yr |
| Hexane | 0.054 lb/yr |
| Methyl Alcohol | 0.163 lb/yr |
| Oakite | 0.022 lb/yr |
| Organics (VOCs) | 0.163 lb/yr |
| Picofluor (Pseudocumene) | 0.218 lb/yr |
| Toluene | 0.54 lb/yr |
| Xylene | 0.326 lb/yr |
| Freon 11 | 104.4 lb/yr |
| **Based on Stored Waste Inventory** | |
| Low Level Waste (Drummed Radiochemicals) | 80.2 lbs |
| Low Level Waste (Plywood Boxes) | 2165.4 lbs |
| Non-radioactive Waste | 581.45 lbs |
| **Based on Building Chemical Inventory** | |
| Process Wastes | 4058.51 lbs |
| **Based on Waste Stream Characterization** | |
| Uranium (-234/235, -238) | Unknown Quantity |
| Beryllium | Unknown Quantity |
| Arsenic | Unknown Quantity |
| Lead | Unknown Quantity |
| "F001" *RCRA Wastes* | Unknown Quantity |
| Tetrachloroethylene | Unknown Quantity |
| Trichloroethylene | Unknown Quantity |
| Methylene Chloride | Unknown Quantity |
| 1,1,1-Trichloroethane | Unknown Quantity |
| Carbon tetrachloride | Unknown Quantity |
| Chlorinated fluorocarbons | Unknown Quantity |
| "F002" *RCRA Wastes* | Unknown Quantity |
| Trichlorofluoromethane (Freon 11) | Unknown Quantity |
| "F003" *RCRA Wastes* | Unknown Quantity |
| Acetone | Unknown Quantity |
| Xylene | Unknown Quantity |
| Cadmium | Unknown Quantity |
| Chromium | Unknown Quantity |
| Peck's Spray 66 | Unknown Quantity |

# APPENDIX D3

## Verification Monitoring Chemicals with Slope Factors and Reference Doses

## Verification Monitoring Chemicals with Slope Factors and Reference Doses

| Chemical to be Monitored | Slope Factor | | Reference Dose | |
|---|---|---|---|---|
| | Oral | Inhalation | Oral | Inhalation |
| Arsenic | 1.75E+00 | 1.51E+01 | 3.00E-04 | - |
| Beryllium | 4.30E+00 | 8.40E+00 | 5.00E-03 | - |
| Cadmium | - | 6.30E+00 | 5.00E-04 | - |
| Carbon tetrachloride | 1.30E-01 | 5.25E-02 | 7.00E-04 | - |
| Chromium III | - | - | 1.00E+00 | - |
| Chromium VI | - | 4.20E+01 | 5.00E-03 | - |
| Ethylene glycol | - | - | 2.00E+00 | - |
| Hexane | - | - | 6.00E-02 | 2.00E-01 |
| Lead | 5.20E-02 | 2.00E-03 | - | - |
| Mercury | - | - | 3.00E-04 | 8.40E-05 |
| Tetrachloroethylene | 5.20E-02 | 2.00E-03 | 1.00E-02 | - |
| Trichloroethane, 1,1,1- | - | - | 9.00E-02 | 2.86E-01 |
| Toluene | - | - | 2.00E-01 | 1.14E-01 |
| Uranium - 234 | 1.60E-11 | 2.60E-08 | - | - |
| Uranium - 235 | 1.60E-11 | 2.50E-08 | - | - |
| Uranium - 238 | 1.60E-11 | 2.40E-08 | - | - |
| Xylene | - | - | 2.00E+00 | - |

# APPENDIX E

## Transition Activity Schedules

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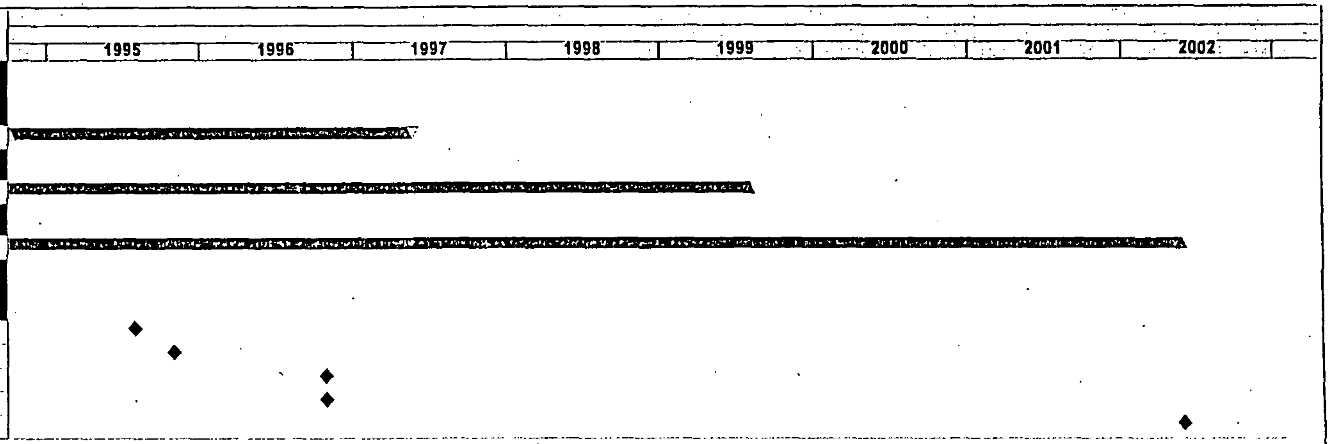
| Activity ID | Activity Description | Early start | Early finish |
|---|---|---|---|
| **SNM Consolidation/ Shrink the PA** | | | |
| **+ 1.0 NEAR TERM SNM REPACKAGING** | | | |
| | | 03OCT94 | 21MAY97 |
| **+ 2.0 INITIATE SNM CONSOL INTO BLDG 371** | | | |
| | | | 02AUG99 |
| **+ 3.0 LONG TERM SNM REPACKAGING** | | | |
| | | | 23MAY02 |
| **KEY MILESTONES** | | | |
| **KEY MILESTONES** | | | |
| 103023001 | Prioritization for Repackaging Pu Metals w/Plasti | | 31JUL95* |
| 103023002 | Repackage All Pu Metals in Direct Contact w/ | | 30OCT95* |
| 103023003 | Thermally Stab. All Exist. Backlog Reactive Pu | | 30OCT96* |
| 103023004 | Repackage Pu Metals & Oxides w/Plastic by | | 30OCT96* |
| 103023005 | Repkg. All Pu Metals/Oxides to Metal/Oxide | | 30MAY02* |



| Activity ID | Activity Description | Early start | Early finish |
|---|---|---|---|
| **Residue Stabilization** | | | |
| **+ 3.1 STABILIZED SALTS** | | | |
| | | 03OCT94 | 31MAY02 |
| **+ 3.2 STABILIZED COMBUSTIBLES** | | | |
| | | 03OCT94 | 11NOV98 |
| **+ 3.3 STABILIZED INORGANICS** | | | |
| | | 03OCT94 | 24MAY02 |
| **+ 3.4 STABILIZED ASH** | | | |
| | | 03OCT94 | 01MAY02 |
| **+ 3.5 STABILIZED WET AND MISCELLANEOUS RESIDUES** | | | |
| | | 03OCT94 | 31MAY02 |
| **+ 3.6 CHARACTERIZED RESIDUES** | | | |
| | | 03OCT94 | 02FEB96 |
| **+ 3.7 MITIGATED SAFETY CONCERNS** | | | |
| | | 06SEP94A | 11JAN96 |
| ***+ 3.8 RESIDUE STABILIZATION PROGRAM MGT.*** | | | |
| | | 14MAR95 | 31MAY02 |
| **KEY MILESTONES** | | | |
| **KEY MILESTONES** | | | |
| 306031001 | Dev.Risk/Site Categ./Prio. Crit. for Stor. Resid | | 02OCT95* |
| 307021001 | Vent 2,045 Drums W/Potential for Hydrogen | | 30OCT95* |
| 305041001 | Vent All Wet/Miscellaneous Residues | | 30OCT96* |
| 305041002 | Vent All Inorganic Residues | | 30OCT96* |
| 301041001 | Stabilize/Repkg. 6,000 kg Highrisk Pu Cont. | | 29MAY97* |
| 304041001 | Stabilize All Sand/Slag/Crucible/Graphite Fines | | 02JUN97* |
| 301041002 | Stab. Remaing.High risk Salts via Chem. | | 19DEC97* |
| 302041001 | Stabilize Higher Risk Combustibles(11,000kg) | | 30NOV98* |

1995 1996 1997 1998 1999 2000 2001 2002

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| Activity ID | Activity Description | Early start | Early finish |
|---|---|---|---|
| **Liquid Stabilization** | | | |
| **Pu SOLUTION STABILIZATION** | | | |
| **Pu SOLUTION STABILIZATION KEY MILESTONES** | | | |
| 401010103 | Complete EA FONSI -- NEPA Analysis for Liq. | | 17APR95* |
| 401010102 | Stabilize 80% High-Level & 50% Low-Level | | 02JUN97* |
| 407101001 | Stabilize All Solutions in Building 771 | | 23DEC97* |
| 403101001 | Stabilize All Solutions in Building 371 | | 30JUN99* |
| **+ 3.0 BLDG. 371 LIQUID STABILIZATION** | | | |
| | | 01OCT93A | 30JUN99 |
| **+ 7.0 BLDG. 771 LIQUID STABILIZATION** | | | |
| | | 27OCT93A | 23DEC97 |
| **+ 8.0 Highly Enriched Uranium Solutions (HEUN)** | | | |
| | | 03OCT94 | 04APR97 |
| **HEUN KEY MILESTONES** | | | |
| **KEY MILESTONES** | | | |
| 408070101 | Begin Shipping HEUN Solutions Offsite for | 31MAY96* | |
| 408070102 | Remove HEUN Solutions from Rocky Flats | | 30OCT96* |
| 408070104 | Ship Converted Oxide to Approved Storage | | 30SEP97* |

1995 1996 1997 1998 1999 2000 2001 2002

Project Start 01AUG94
Project Finish 25MAR44
Data Date 01OCT94

Early Bar
Progress Bar
Critical Activity

IPPB

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7MARCH95

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| Date | Revision | Checked | Approved |
|---|---|---|---|

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| Activity ID | Activity Description | Early start | Early finish | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Excess Materials** | | | | | | | | | | | |
| **+ SNM OFFSITE SHIPMENTS** | | | | | | | | | | | |
| 705060000 | SNM OFFSITE SHIPMENTS | 03OCT94 | 18DEC98 | | | | | | | | |

| | | | |
|---|---|---|---|
| Project Start | 01AUG94 | Early Bar | IPPB |
| Project Finish | 25MAR44 | Progress Bar | |
| Data Date | 01OCT94 | Critical Activity | |
| Plot Date | 08MAR95 | | |

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94.1 ACTIVITIES

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| Date | Pre-Decisional Working Copy Revision | Checked | Approved |
|---|---|---|---|
| | | | |

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| Activity ID | Activity Description | Early start | Early finish |
|---|---|---|---|
| **SNM Consolidation/ Shrink the PA** | | | |
| **1.0 NEAR TERM SNM REPACKAGING** | | | |
| **+ 1.1 BRUSH & REPACKAGE B371 ITEMS** | | | |
| | | 03OCT94 | 16APR96 |
| **+ 1.2 BRUSH & REPACKAGE 700 AREA ITEMS** | | | |
| | | 01FEB95 | 26SEP96 |
| **+ 1.3 PU STARTUP TEST PROGRAM (600° C)** | | | |
| | | 03OCT94 | 17JUL95 |
| **+ 1.4 UNRESTRICTED THERMAL STAB (800°)** | | | |
| | | 03OCT94 | 24OCT96 |
| **+ 1.5 FY96 SIZING OF LARGE ITEMS** | | | |
| | | 02OCT95 | 20MAY97 |
| **+ 1.6 SNM NEAR TERM MGMT & ADMIN** | | | |
| | | 03OCT94 | 21MAY97 |
| **2.0 INITIATE SNM CONSOL INTO BLDG 371** | | | |
| **+ 2.1 B371 PREPARATION** | | | |
| | | 03OCT94 | 29FEB96 |
| **+ 2.2 B371 INCREASE STORAGE CAPACITY** | | | |
| | | | 23NOV98 |
| **+ 2.3 EXPORT BLDG/TRANSFER PREPS** | | | |
| | | | 03JUN99 |
| **+ 2.4 EXPORT MATERIAL TRANSFER** | | | |
| | | 03OCT94 | 02AUG99 |
| **3.0 LONG TERM SNM REPACKAGING** | | | |
| **+ 3.1 LIFE CYCLE ASSESSMENT** | | | |
| 103010400 | ENVIRONMENTAL ASSESSMENT - | 03OCT94A | 20SEP95 |
| **+ 3.2 LONG TERM STORAGE** | | | |
| | | 03OCT94 | 23MAY02 |
| **+ 3.3 CAPITAL PROJECTS** | | | |
| | | 03OCT94 | 21FEB01 |
| **KEY MILESTONES** | | | |
| **KEY MILESTONES** | | | |
| 103023001 | Prioritization for Repackaging Pu Metals w/Plasti | | 31JUL95* |
| 103023002 | Repackage All Pu Metals in Direct Contact w/ | | 30OCT95* |
| 103023003 | Thermally Stab. All Exist. Backlog Reactive Pu | | 30OCT96* |
| 103023004 | Repackage Pu Metals & Oxides w/Plastic by | | 30OCT96* |
| 103023005 | Repkg. All Pu Metals/Oxides to Metal/Oxide | | 30MAY02* |

Timeline: 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002

| | | |
|---|---|---|
| Project Start | 01AUG94 | Early Bar |
| Project Finish | 25MAR44 | Progress Bar |
| Data Date | 01OCT94 | Critical Activity |

IPPB

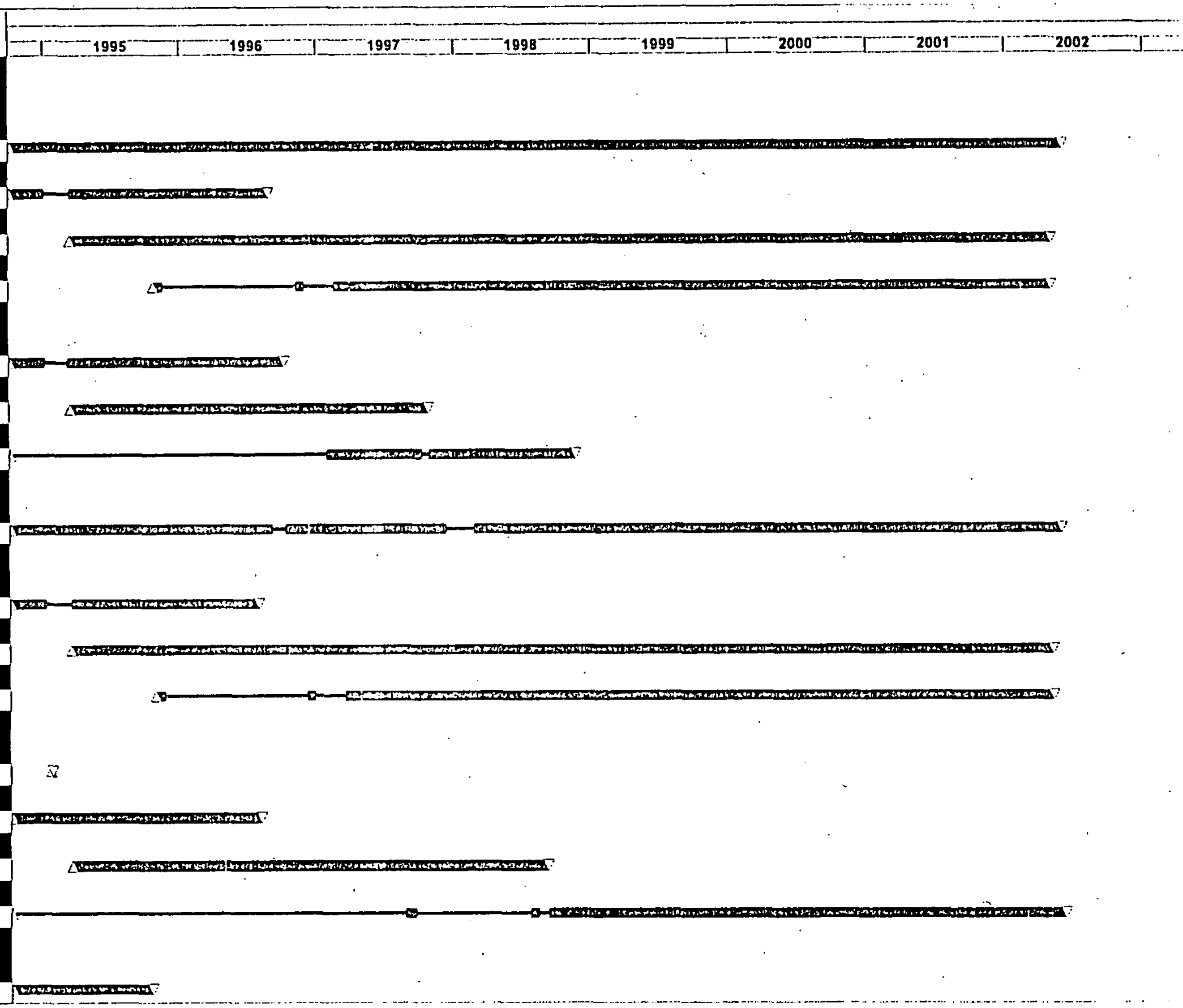
RFETS
7MARCH95

Sheet 1 of 6

Pre-Decisional Working Copy

| Date | Revision | Checked | Approved |
|---|---|---|---|

| Activity ID | Activity Description | Early start | Early finish |
|---|---|---|---|
| | **Residue Stabilization** | | |
| | **3.1 STABILIZED SALTS** | | |
| | **+ 3.1.1 TRTMT PROCESS & FACILITY SELECTION** | 03OCT94 | 31MAY02 |
| | **+ 3.1.2 ACTIVITY BASED AUTHORIZATION** | 03OCT94 | 26AUG96 |
| | **+ 3.1.3 SALTS PROCESS AND FACILITY PREP** | 14MAR95 | 01MAY02 |
| | **+ 3.1.4 FACILITY OPERATION SALT** | 20OCT95 | 01MAY02 |
| | **3.2 STABILIZED COMBUSTIBLES** | | |
| | **+ 3.2.2 ACTIVITY BASED AUTHORIZATION** | 03OCT94 | 04OCT96 |
| | **+ 3.2.3 COMBUSTIBLE PROCESS & FACILITY PREP** | 14MAR95 | 17OCT97 |
| | **+ 3.2.4 FACILITY OPERATION COMBUSTIBLES** | 03OCT94 | 11NOV98 |
| | **3.3 STABILIZED INORGANICS** | | |
| | **+ 3.3.1 INORGANIC REPACK** | 03OCT94 | 24MAY02 |
| | **3.4 STABILIZED ASH** | | |
| | **+ 3.4.2 ACTIVITY BASED AUTHORIZATION** | 03OCT94 | 23JUL96 |
| | **+ 3.4.3 ASH PROCESS AND FACILITY PREP** | 14MAR95 | 01MAY02 |
| | **+ 3.4.4 FACILITY OPERATION ASH** | 20OCT95 | 01MAY02 |
| | **3.5 STABILIZED WET AND MISCELLANEOUS RESIDUES** | | |
| | **+ 3.5.1 TRTMT PROCESS & FACILITY SELECTION - WETRE** | 18JAN95 | 20JAN95 |
| | **+ 3.5.2 ACTIVITY BASED AUTHORIZATION** | 03OCT94 | 26JUL96 |
| | **+ 3.5.3 WET RES PROCESS & FACILITY PREP** | 14MAR95 | 26AUG98 |
| | **+ 3.5.4 FACILITY OPERATION WET RES** | 03OCT94 | 31MAY02 |
| | **3.6 CHARACTERIZED RESIDUES** | | |
| | **+ 3.6.1 SOLID RESIDUE CHARACTERIZATION** | 03OCT94 | 09OCT95 |

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| | | |
|---|---|---|
| Project Start | 01AUG94 | Early Bar |
| Project Finish | 25MAR44 | Progress Bar |
| Data Date | 01OCT94 | Critical Activity |

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Pre-Decisional Working Copy

| Date | Revision | Checked | Approved |
|---|---|---|---|

| Activity ID | Activity Description | Early start | Early finish |
|---|---|---|---|
| **+ 3.6.2 HEAD SPACE GAS SAMPLING** | | | |
| | | 20FEB95 | 25SEP95 |
| **+ 3.6.3 IMPLEMENT NEW TECHNOLOGIES** | | | |
| | | 20JAN95 | 02FEB96 |
| **3.7 MITIGATED SAFETY CONCERNS** | | | |
| **+ 3.7.1 ELEVATED H2 ER SALT DRUM** | | | |
| | | 06SEP94A | 01DEC95 |
| **+ 3.7.2 B371 DRUM VENTING** | | | |
| | | 27JAN95 | 07DEC95 |
| **+ 3.7.4 MITIGATION OF ANTICIPATED SAFETY CONCERNS** | | | |
| | | 03APR95 | 11JAN96 |
| **3.8 RESIDUE STABILIZATION PROGRAM MGT.** | | | |
| **+ 3.8.1 PROGRAM PLANNING** | | | |
| 308010100 | PROGRAM PLANS | 14MAR95 | 05SEP95 |
| **+ 3.8.2 PROGRAM CONTROLS** | | | |
| 308020100 | PROGRAM CONTROL | 14MAR95 | 31MAY02 |
| **+ 3.8.3 PROGRAM INTEGRATION** | | | |
| 308030100 | PROGRAM INTEGRATION | 14MAR95 | 31MAY02 |
| **+ 3.8.4 CONFIGURATION MANAGEMENT** | | | |
| 308040100 | CONFIGURATION MANAGEMENT | 14MAR95 | 31MAY02 |
| **+ 3.8.6 STAKEHOLDER INVOLVEMENT** | | | |
| 308050100 | STAKEHOLDER INVOLVEMENT | 14MAR95 | 26JAN98 |
| **KEY MILESTONES** | | | |
| **KEY MILESTONES** | | | |
| 306031001 | Dev.Risk/Site Categ./Prio. Crit. for Stor. Resid | | 02OCT95* |
| 307021001 | Vent 2,045 Drums W/Potential for Hydrogen | | 30OCT95* |
| 305041001 | Vent All Wet/Miscellaneous Residues | | 30OCT96* |
| 305041002 | Vent All Inorganic Residues | | 30OCT96* |
| 301041001 | Stabilize/Repkg. 6,000 kg Highrisk Pu Cont. | | 29MAY97* |
| 304041001 | Stabilize All Sand/Slag/Crucible/Graphite Fines | | 02JUN97* |
| 301041002 | Stab. Remaing.High risk Salts via Chem. | | 19DEC97* |
| 302041001 | Stabilize Higher Risk Combustibles(11,000kg) | | 30NOV98* |

1995 1996 1997 1998 1999 2000 2001 2002

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| | |
|---|---|
| Project Start | 01AUG94 |
| Project Finish | 25MAR44 |
| Data Date | 01OCT94 |
| Plot Date | 08MAR95 |

Early Bar
Progress Bar
Critical Activity

IPPB

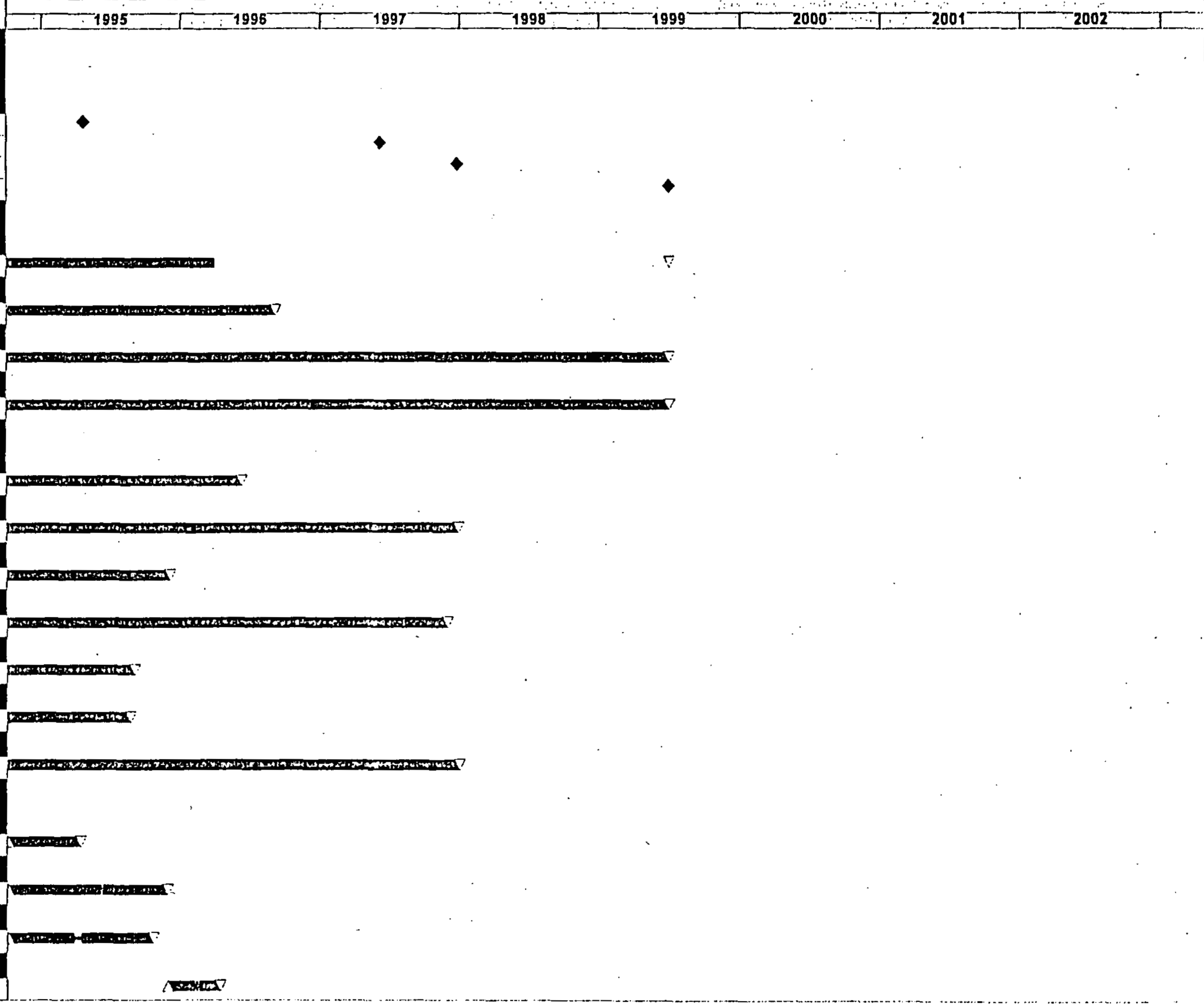
RFETS
7MARCH95
94-1 ACTIVITIES



Pre-Decisional Working Copy

| Date | Revision | Checked | Approved |
|---|---|---|---|
| | | | |

| Activity ID | Activity Description | Early start | Early finish |
|---|---|---|---|
| **Liquid Stabilization** | | | |
| **Pu SOLUTION STABILIZATION** | | | |
| **Pu SOLUTION STABILIZATION KEY MILESTONES** | | | |
| 401010103 | Complete EA FONSI -- NEPA Analysis for Liq. | | 17APR95* |
| 401010102 | Stabilize 80% High-Level & 50% Low-Level | | 02JUN97* |
| 407101001 | Stabilize All Solutions in Building 771 | | 23DEC97* |
| 403101001 | Stabilize All Solutions in Building 371 | | 30JUN99* |
| **3.0 BLDG. 371 LIQUID STABILIZATION** | | | |
| **+ 3.1 B371 CAUSTIC WASTE TREATMENT SYSTEM** | | | |
| | | 01OCT93A | 30JUN99 |
| **+ 3.2 B371 TANK DRAINING** | | | |
| | | 27MAY94A | 03SEP96 |
| **+ 3.3 B371 ROOM DRAINING** | | | |
| | | 15AUG94A | 30JUN99 |
| **+ 3.9 B371 PROGRAM MANAGEMENT/OTHER** | | | |
| | | 01OCT93A | 30JUN99 |
| **7.0 BLDG. 771 LIQUID STABILIZATION** | | | |
| **+ 7.1 HYDROXIDE PRECIPITATION** | | | |
| | | 01APR94A | 07JUN96 |
| **+ 7.2 B771 OXALATE PRECIPITATION** | | | |
| | | 07MAR94A | 23DEC97 |
| **+ 7.3 B771 TANK DRAINING** | | | |
| | | 25FEB94A | 01DEC95 |
| **+ 7.4 B771 ROOM DRAINING** | | | |
| | | 17MAR94A | 26NOV97 |
| **+ 7.5 B771 RESIN REMOVAL** | | | |
| | | 13DEC93A | 30AUG95 |
| **+ 7.6 B771 CARRIER PRECIPITATION RESTART** | | | |
| | | 19SEP94A | 17AUG95 |
| **+ 7.7 PROGRAM SUPPORT** | | | |
| | | 27OCT93A | 23DEC97 |
| **8.0 Highly Enriched Uranium Solutions (HEUN)** | | | |
| **+ 8.1 Option Decision** | | | |
| | | 03OCT94 | 12APR95 |
| **+ 8.2 Buildng Readiness** | | | |
| | | 03OCT94 | 21NOV95 |
| **+ 8.4 Safety Envelope** | | | |
| | | 03OCT94 | 17OCT95 |
| **+ 8.5 Readiness Review** | | | |
| | | 22NOV95 | 08APR96 |



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| Activity ID | Activity Description | Early start | Early finish |
|---|---|---|---|
| **+ 8.6 Solution Removal** | | | |
| | | 09MAR95 | 04APR97 |
| **HEUN KEY MILESTONES** | | | |
| **KEY MILESTONES** | | | |
| 408070101 | Begin Shipping HEUN Solutions Offsite for | 31MAY96* | |
| 408070102 | Remove HEUN Solutions from Rocky Flats | | 30OCT96* |
| 408070104 | Ship Converted Oxide to Approved Storage | | 30SEP97* |

1995 1996 1997 1998 1999 2000 2001 2002

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| | | |
|---|---|---|
| Project Start | 01AUG94 | Early Bar |
| Project Finish | 25MAR44 | Progress Bar |
| Data Date | 01OCT94 | Critical Activity |

IPPB

RFETS
7MARCH95

Sheet 5 of 8

Pre-Decisional Working Copy

| Date | Revision | Checked | Approved |
|---|---|---|---|

| Activity ID | Activity Description | Early start | Early finish | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Excess Materials** | | | | | | | | | | | |
| **SNM OFFSITE SHIPMENTS** | | | | | | | | | | | |
| **+ SNM Offsite Shipments** | | | | | | | | | | | |
| 705060000 | SNM OFFSITE SHIPMENTS | 03OCT94 | 18DEC98 | | | | | | | | |

RFETS — PRIMAVERA PROJECT PLANNER — INTEGRATED SITE SCHEDULE

REPORT DATE 07MAR95 RUN NO. 439 14:37 — COST LOADING REPORT — START DATE 01AUG94 FIN DATE 25MAR44

Total Cost - Lvl 1 - SNM Consolidation — TOTAL USAGE FOR YEAR — DATA DATE 01OCT94 PAGE NO. 1

| ACT ID | DESC | FY 1995 | FY 1996 | FY 1997 | FY 1998 | FY 1999 | FY 2000 | FY 2001 | FY 2002 | FY 2003 | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| C - NONLABOR | | | | | | | | | | | |
| 102 | 2.0 INITIATE SNM CONSOL INTO BLDG 371 | 125 | | | | | | | | | 125 |
| 103 | 3.0 LONG TERM SNM REPACKAGING | 9974350 | 8102742 | 14520207 | 27725428 | 21927368 | 7099578 | 1725862 | 49464 | | 91125000 |
| TOTAL | C | 9974475 | 8102742 | 14520207 | 27725428 | 21927368 | 7099578 | 1725862 | 49464 | | 91125128 |
| E - NLABEXPS | | | | | | | | | | | |
| 101 | 1.0 NEAR TERM SNM REPACKAGING | 354368 | 259133 | 124899 | | | | | | | 738400 |
| 102 | 2.0 INITIATE SNM CONSOL INTO BLDG 371 | 81953 | 47352 | 69016 | 95143 | 14236 | | | | | 307700 |
| 103 | 3.0 LONG TERM SNM REPACKAGING | 31577 | 164194 | 184959 | 1261385 | 2095303 | 2557503 | 2547232 | 1622848 | | 10465000 |
| TOTAL | E | 467898 | 470679 | 378874 | 1356529 | 2109539 | 2557503 | 2547232 | 1622848 | | 11511100 |
| L - LABOR | | | | | | | | | | | |
| 101 | 1.0 NEAR TERM SNM REPACKAGING | 4541716 | 11975286 | 2915974 | | | | | | | 19432976 |
| 102 | 2.0 INITIATE SNM CONSOL INTO BLDG 371 | 1919733 | 988890 | 4677868 | 6137067 | 2193255 | | | | | 15916813 |
| 103 | 3.0 LONG TERM SNM REPACKAGING | 1922478 | 2238928 | 4991403 | 14790648 | 20099966 | 21199756 | 19841358 | 12425760 | | 97510296 |
| TOTAL | L | 8383927 | 15203104 | 12585245 | 20927714 | 22293220 | 21199756 | 19841358 | 12425760 | | 132860088 |
| | REPORT TOTAL | 18826300 | 23776524 | 27484326 | 50009672 | 46330128 | 30856836 | 24114450 | 14098072 | | 235496304 |

*NOTE: Inconsistencies in cost exist between Volume I & Volume II. Refinements in cost estimates are underway and inconsistencies between volumes will be addressed in the next revision.*

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RFETS

REPORT DATE 08MAR95 RUN NO. 457
09:38

PRIMAVERA PROJECT PLANNER

COST LOADING REPORT

INTEGRATED SITE SCHEDULE

START DATE 01AUG94 FIN DATE 25MAR44

DATA DATE 01OCT94 PAGE NO. 1

TOTAL USAGE FOR YEAR

Total Cost - Lvl 1 - Residue Stabilization

| ACT ID | DESC | FY 1995 | FY 1996 | FY 1997 | FY 1998 | FY 1999 | FY 2000 | FY 2001 | FY 2002 | FY 2003 | FY 2004 | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C - NONLABOR | | | | | | | | | | | | |
| 101 | 3.1 STABILIZED SALTS | | 13275894 | 4687018 | | | | | | | | 17962912 |
| 102 | 3.2 STABILIZED COMBUSTIBLES | | 1367273 | 15234850 | | | | | | | | 16602122 |
| 104 | 3.4 STABILIZED ASH | | 11561132 | 6401781 | | | | | | | | 17962912 |
| 105 | 3.5 STABILIZED WET AND MISCELLANEOUS RESIDUES | | 510990 | 2637806 | 4801150 | | | | | | | 7949945 |
| 106 | 3.6 CHARACTERIZED RESIDUES | 786667 | 413333 | | | | | | | | | 1200000 |
| TOTAL | C | 786667 | 27128622 | 28961454 | 4801150 | | | | | | | 61677892 |
| E - NLABEXPS | | | | | | | | | | | | |
| 101 | 3.1 STABILIZED SALTS | 543383 | 436258 | 788441 | 1032093 | 848980 | 1036255 | 1032093 | 639516 | | | 6357020 |
| 102 | 3.2 STABILIZED COMBUSTIBLES | 163020 | | 1926000 | 1744681 | 255319 | | | | | | 4089020 |
| 104 | 3.4 STABILIZED ASH | 143020 | 312500 | 850746 | 1850746 | 1522388 | 1858209 | 1850746 | 1067164 | | | 9455520 |
| 105 | 3.5 STABILIZED WET AND MISCELLANEOUS RESIDUES | 155520 | | 70886 | 89114 | 1966860 | 2461047 | 2451163 | 1620930 | | | 8815520 |
| 108 | 3.8 RESIDUE STABILIZATION PROGRAM MGT. | 64000 | 113829 | 113371 | 113371 | 93257 | 113829 | 113371 | 74971 | | | 800000 |
| TOTAL | E | 1068943 | 862587 | 3749445 | 4830006 | 4686805 | 5469339 | 5447374 | 3402582 | | | 29517080 |
| L - LABOR | | | | | | | | | | | | |
| 101 | 3.1 STABILIZED SALTS | 2519103 | 4415830 | 4643105 | 6778305 | 5575703 | 6805637 | 6778305 | 3911271 | | | 41427256 |
| 102 | 3.2 STABILIZED COMBUSTIBLES | 2803963 | 1287102 | 3258593 | 6217563 | 837274 | | | | | | 14404495 |
| 103 | 3.3 STABILIZED INORGANICS | 2601166 | 2411607 | 2581926 | 2611155 | 2305888 | 2640140 | 2496677 | 1837725 | | | 19486282 |
| 104 | 3.4 STABILIZED ASH | 2640692 | 3917690 | 4840547 | 7916951 | 6512331 | 7948874 | 7916951 | 4565016 | | | 46259052 |
| 105 | 3.5 STABILIZED WET AND MISCELLANEOUS RESIDUES | 2452542 | 1242977 | 846853 | 1681158 | 11938327 | 14826981 | 14767435 | 9765562 | | | 57521836 |
| 106 | 3.6 CHARACTERIZED RESIDUES | 2634664 | 13333 | | | | | | | | | 2647998 |
| 107 | 3.7 MITIGATED SAFETY CONCERNS | 1728577 | 319917 | | | | | | | | | 2048494 |
| 108 | 3.8 RESIDUE STABILIZATION PROGRAM MGT. | 1535101 | 1302984 | 1297751 | 1187416 | 937399 | 1144178 | 1139583 | 753595 | | | 9298005 |
| TOTAL | L | 18915808 | 14911441 | 17468774 | 26392548 | 28106922 | 33365812 | 33098952 | 20833168 | | | 193093424 |
| | REPORT TOTAL | 20771418 | 42902648 | 50179672 | 36023704 | 32793726 | 38835152 | 38546328 | 24235752 | | | 284288384 |

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RFETS PRIMAVERA PROJECT PLANNER INTEGRATED SITE SCHEDULE

REPORT DATE 07MAR95 RUN NO. 441 COST LOADING REPORT START DATE 01AUG94 FIN DATE 25MAR44
14:39

DATA DATE 01OCT94 PAGE NO. 1

Total Cost - Lvl 1 - Liquid Stabilization TOTAL USAGE FOR YEAR

| ACT ID | DESC | FY 1995 | FY 1996 | FY 1997 | FY 1998 | FY 1999 | FY 2000 | FY 2001 | FY 2002 | FY 2003 | FY 2004 | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C - NONLABOR | | | | | | | | | | | | |
| 408 | 8.0 Highly Enriched Uranium Solutions (HEUN) | 225000 | | | | | | | | | | 225000 |
| TOTAL | C | 225000 | | | | | | | | | | 225000 |
| E - NLABEXPS | | | | | | | | | | | | |
| 403 | 3.0 BLDG. 371 LIQUID STABILIZATION | 1248280 | 1167904 | 931174 | 978710 | 485134 | | | | | | 4811203 |
| 407 | 7.0 BLDG. 771 LIQUID STABILIZATION | 2292996 | 1243658 | 1117465 | 261319 | | | | | | | 4915438 |
| 408 | 8.0 Highly Enriched Uranium Solutions (HEUN) | 1673442 | 6009505 | 7918728 | | | | | | | | 15601674 |
| TOTAL | E | 5214719 | 8421068 | 9967366 | 1240029 | 485134 | | | | | | 25328314 |
| L - LABOR | | | | | | | | | | | | |
| 403 | 3.0 BLDG. 371 LIQUID STABILIZATION | 5658879 | 7095849 | 8410884 | 7078114 | 2332459 | | | | | | 30576184 |
| 407 | 7.0 BLDG. 771 LIQUID STABILIZATION | 15851240 | 14647511 | 11812387 | 2127532 | | | | | | | 44438668 |
| 408 | 8.0 Highly Enriched Uranium Solutions (HEUN) | 2791822 | 739276 | 377037 | | | | | | | | 3908135 |
| TOTAL | L | 24301940 | 22482636 | 20600306 | 9205646 | 2332459 | | | | | | 78922992 |
| | REPORT TOTAL | 29741658 | 30903704 | 30567672 | 10445675 | 2817593 | | | | | | 104476304 |

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RFETS  PRIMAVERA PROJECT PLANNER  INTEGRATED SITE SCHEDULE

REPORT DATE 07MAR95 RUN NO. 439  COST LOADING REPORT  START DATE 01AUG94 FIN DATE 25MAR44
17:28

DATA DATE 01OCT94 PAGE NO. 1

Total Cost - Lvl 1 - Excess Material  TOTAL USAGE FOR YEAR

| ACT ID | DESC | FY 1995 | FY 1996 | FY 1997 | FY 1998 | FY 1999 | FY 2000 | FY 2001 | FY 2002 | FY 2003 | FY 2004 | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| E - NLABEXPS | | | | | | | | | | | | |
| 705 | SNM OFFSITE SHIPMENTS | 1179561 | 1189112 | 1184336 | 1184336 | 262655 | | | | | | 5000000 |
| TOTAL | E | 1179561 | 1189112 | 1184336 | 1184336 | 262655 | | | | | | 5000000 |
| | REPORT TOTAL | 1179561 | 1189112 | 1184336 | 1184336 | 262655 | | | | | | 5000000 |

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RFETS | PRIMAVERA PROJECT PLANNER | INTEGRATED SITE SCHEDULE

REPORT DATE 07MAR95 RUN NO. 435
14:35

COST LOADING REPORT

START DATE 01AUG94 FIN DATE 25MAR44

DATA DATE 01OCT94 PAGE NO. 1

Total Cost - Lvl 2 - SNM Consolidation

TOTAL USAGE FOR YEAR

| ACT ID | DESC | FY 1995 | FY 1996 | FY 1997 | FY 1998 | FY 1999 | FY 2000 | FY 2001 | FY 2002 | FY 2003 | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| C - NONLABOR | | | | | | | | | | | |
| 10201 | 2.1 B371 PREPARATION | 125 | | | | | | | | | 125 |
| 10302 | 3.2 LONG TERM STORAG | | 4222223 | 5722818 | 512009 | 201814 | 246331 | 245342 | 49464 | | 11200000 |
| 10303 | 3.3 CAPITAL PROJECTS | 9974350 | 3880519 | 8797389 | 27213420 | 21725556 | 6853247 | 1480519 | | | 79925000 |
| TOTAL | C | 9974475 | 8102742 | 14520207 | 27725428 | 21927368 | 7099578 | 1725862 | 49464 | | 91125128 |
| E - NLABEXPS | | | | | | | | | | | |
| 10101 | 1.1 BRUSH & REPACKAG | 16000 | | | | | | | | | 16000 |
| 10102 | 1.2 BRUSH & REPACKA | 321 | 39679 | | | | | | | | 40000 |
| 10103 | 1.3 PU STARTUP TEST | 150000 | | | | | | | | | 150000 |
| 10104 | 1.4 UNRESTRICTED THE | 17832 | 18782 | 786 | | | | | | | 37400 |
| 10105 | 1.5 FY96 SIZING OF L | | 29080 | 15920 | | | | | | | 45000 |
| 10106 | 1.6 SNM NEAR TERM MG | 170214 | 171593 | 108193 | | | | | | | 450000 |
| 10201 | 2.1 B371 PREPARATION | 35058 | 142 | | | | | | | | 35200 |
| 10203 | 2.3 EXPORT BLDG/TRAN | 46895 | 43210 | 67327 | 75979 | 6589 | | | | | 240000 |
| 10204 | 2.4 EXPORT MATERIAL | | 4000 | 1689 | 19164 | 7647 | | | | | 32500 |
| 10301 | 3.1 LIFE CYCLE ASSES | 5000 | | | | | | | | | 5000 |
| 10302 | 3.2 LONG TERM STORAG | 26577 | 164194 | 184959 | 1261385 | 2095303 | 2557503 | 2547232 | 1622848 | | 10460000 |
| TOTAL | E | 467898 | 470679 | 378874 | 1356529 | 2109539 | 2557503 | 2547232 | 1622848 | | 11511100 |
| L - LABOR | | | | | | | | | | | |
| 10101 | 1.1 BRUSH & REPACKAG | 2164543 | 3384180 | | | | | | | | 5548723 |
| 10102 | 1.2 BRUSH & REPACKA | 701696 | 3011672 | | | | | | | | 3713368 |
| 10103 | 1.3 PU STARTUP TEST | 665192 | | | | | | | | | 665192 |
| 10104 | 1.4 UNRESTRICTED THE | 135210 | 302357 | 19533 | | | | | | | 457100 |
| 10105 | 1.5 FY96 SIZING OF L | | 4394916 | 2340220 | | | | | | | 6735136 |
| 10106 | 1.6 SNM NEAR TERM MG | 875075 | 882160 | 556222 | | | | | | | 2313457 |
| 10201 | 2.1 B371 PREPARATION | 759482 | 2163 | | | | | | | | 761645 |
| 10202 | 2.2 B371 INCREASE ST | 161598 | 350645 | 379867 | 267415 | 17509 | | | | | 1177033 |
| 10203 | 2.3 EXPORT BLDG/TRAN | 766607 | 401534 | 3924633 | 3725403 | 43079 | | | | | 8861256 |
| 10204 | 2.4 EXPORT MATERIAL | 232046 | 234549 | 373368 | 2144249 | 2132668 | | | | | 5116880 |
| 10301 | 3.1 LIFE CYCLE ASSES | 192600 | | | | | | | | | 192600 |
| 10302 | 3.2 LONG TERM STORAG | 387376 | 1375809 | 3161043 | 9764972 | 16050239 | 19590732 | 19512054 | 12425760 | | 82267984 |
| 10303 | 3.3 CAPITAL PROJECTS | 1342502 | 863120 | 1830360 | 5025676 | 4049726 | 1609025 | 329303 | | | 15049711 |
| TOTAL | L | 8383927 | 15203104 | 12585245 | 20927714 | 22293220 | 21199758 | 19841358 | 12425760 | | 132860088 |
| | REPORT TOTAL | 18826300 | 23776524 | 27484326 | 50009672 | 46330128 | 30856838 | 24114450 | 14098072 | | 235496304 |

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RFETS | PRIMAVERA PROJECT PLANNER | INTEGRATED SITE SCHEDULE

REPORT DATE 08MAR95 RUN NO. 456 | COST LOADING REPORT | START DATE 01AUG94 FIN DATE 25MAR44
09:35

DATA DATE 01OCT94 PAGE NO. 1

Total Cost - Lvl 2 - Residue Stabilization | TOTAL USAGE FOR YEAR

| ACT ID | DESC | FY 1995 | FY 1996 | FY 1997 | FY 1998 | FY 1999 | FY 2000 | FY 2001 | FY 2002 | FY 2003 | FY 2004 | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C - NONLABOR | | | | | | | | | | | | |
| 10103 | 3.1.3 SALTS PROCESS AND FACILITY PREP | | 13275894 | 4687018 | | | | | | | | 17962912 |
| 10203 | 3.2.3 COMBUSTIBLE PROCESS & FACILITY PREP | | 1367273 | 15234850 | | | | | | | | 16602122 |
| 10403 | 3.4.3 ASH PROCESS AND FACILITY PREP | | 11561132 | 6401781 | | | | | | | | 17962912 |
| 10503 | 3.5.3 WET RES PROCESS & FACILITY PREP | | 510990 | 2637806 | 4801150 | | | | | | | 7949945 |
| 10603 | 3.6.3 IMPLEMENT NEW TECHNOLOGIES | 786667 | 413333 | | | | | | | | | 1200000 |
| TOTAL | C | 786667 | 27128622 | 28961454 | 4801150 | | | | | | | 61677892 |
| E - NLABEXPS | | | | | | | | | | | | |
| 10101 | 3.1.1 TRTMT PROCESS & FACILITY SELECTION | 400363 | 123758 | 524313 | 524313 | 431290 | 526427 | 524313 | 346723 | | | 3401500 |
| 30102 | 3.1.2 ACTIVITY BASED AUTHORIZATION | 143020 | 12500 | | | | | | | | | 155520 |
| 30103 | 3.1.3 SALTS PROCESS AND FACILITY PREP | | 300000 | | | | | | | | | 300000 |
| 10104 | 3.1.4 FACILITY OPERATION SALT | | | 264128 | 507781 | 417690 | 509828 | 507781 | 292793 | | | 2500000 |
| 30202 | 3.2.2 ACTIVITY BASED AUTHORIZATION | 163020 | | | | | | | | | | 163020 |
| 30203 | 3.2.3 COMBUSTIBLE PROCESS & FACILITY PREP | | | 1926000 | | | | | | | | 1926000 |
| 30204 | 3.2.4 FACILITY OPERATION COMBUSTIBLES | | | | 1744681 | 255319 | | | | | | 2000000 |
| 30402 | 3.4.2 ACTIVITY BASED AUTHORIZATION | 143020 | 12500 | | | | | | | | | 155520 |
| 10403 | 3.4.3 ASH PROCESS AND FACILITY PREP | | 300000 | | | | | | | | | 300000 |
| 30404 | 3.4.4 FACILITY OPERATION ASH | | | 850746 | 1850746 | 1522388 | 1858209 | 1850746 | 1067164 | | | 9000000 |
| 30502 | 3.5.2 ACTIVITY BASED AUTHORIZATION | 155520 | | | | | | | | | | 155520 |
| 30503 | 3.5.3 WET RES PROCESS & FACILITY PREP | | | 70886 | 89114 | | | | | | | 160000 |
| 30504 | 3.5.4 FACILITY OPERATION WET RES | | | | | 1966860 | 2461047 | 2451163 | 1620930 | | | 8500000 |
| 30802 | 3.8.2 PROGRAM CONTROLS | 64000 | 113829 | 113371 | 113371 | 93257 | 113829 | 113371 | 74971 | | | 800000 |
| TOTAL | E | 1068943 | 862587 | 3749445 | 4830006 | 4686805 | 5469339 | 5447374 | 3402582 | | | 29517080 |
| L - LABOR | | | | | | | | | | | | |
| 10101 | 3.1.1 TRTMT PROCESS & FACILITY SELECTION | 195684 | 202365 | 33222 | 33222 | 27327 | 33356 | 33222 | 21969 | | | 580366 |
| 10102 | 3.1.2 ACTIVITY BASED AUTHORIZATION | 1749747 | 954937 | | | | | | | | | 2704684 |
| 10103 | 3.1.3 SALTS PROCESS AND FACILITY PREP | 573672 | 3246688 | 579352 | | | | | | | | 4399711 |
| 10104 | 3.1.4 FACILITY OPERATION SALT | | 11840 | 4030532 | 6745084 | 5548376 | 6772282 | 6745084 | 3889302 | | | 33742496 |
| 10202 | 3.2.2 ACTIVITY BASED AUTHORIZATION | 2171422 | 786724 | 2080 | | | | | | | | 2960226 |
| 30203 | 3.2.3 COMBUSTIBLE PROCESS & FACILITY PREP | 632541 | 500378 | 2316605 | 214500 | | | | | | | 3664025 |
| 10204 | 3.2.4 FACILITY OPERATION COMBUSTIBLES | | | 939908 | 6003063 | 837274 | | | | | | 7780245 |
| 10301 | 3.3.1 INORGANIC REPACK | 2601166 | 2411607 | 2581926 | 2611155 | 2305888 | 2640140 | 2496677 | 1837725 | | | 19486282 |
| 30402 | 3.4.2 ACTIVITY BASED AUTHORIZATION | 2067021 | 757775 | | | | | | | | | 2824796 |
| 30403 | 3.4.3 ASH PROCESS AND FACILITY PREP | 573672 | 3148075 | 679303 | | | | | | | | 4401050 |
| 30404 | 3.4.4 FACILITY OPERATION ASH | | 11840 | 4161244 | 7916951 | 6512331 | 7948874 | 7916951 | 4565016 | | | 39033208 |
| 30502 | 3.5.2 ACTIVITY BASED AUTHORIZATION | 2097302 | 729846 | | | | | | | | | 2827148 |
| 30503 | 3.5.3 WET RES PROCESS & FACILITY PREP | 355240 | 513132 | 834853 | 1246631 | | | | | | | 2949855 |
| 30504 | 3.5.4 FACILITY OPERATION WET RES | | | 12000 | 434528 | 11938327 | 14826981 | 14767435 | 9765562 | | | 51744832 |
| 30601 | 3.6.1 SOLID RESIDUE CHARACTERIZATION | 2183911 | 8198 | | | | | | | | | 2192109 |
| 30602 | 3.6.2 HEAD SPACE GAS SAMPLING | 339779 | | | | | | | | | | 339779 |
| 30603 | 3.6.3 IMPLEMENT NEW TECHNOLOGIES | 110975 | 5136 | | | | | | | | | 116111 |
| 10701 | 3.7.1 ELEVATED H2 ER SALT DRUM | 362792 | 314 | | | | | | | | | 363106 |
| 30702 | 3.7.2 B371 DRUM VENTING | 1186011 | 296303 | | | | | | | | | 1482314 |
| 30704 | 3.7.4 MITIGATION OF ANTICIPATED SAFETY CONCERNS | 179774 | 23300 | | | | | | | | | 203073 |
| 30801 | 3.8.1 PROGRAM PLANNING | 802500 | | | | | | | | | | 802500 |
| 10802 | 3.8.2 PROGRAM CONTROLS | 343100 | 610228 | 607777 | 607777 | 499946 | 610228 | 607777 | 401917 | | | 4288752 |
| 10803 | 3.8.3 PROGRAM INTEGRATION | 214438 | 381393 | 379861 | 379861 | 312466 | 381393 | 379861 | 251198 | | | 2680470 |
| 30804 | 3.8.4 CONFIGURATION MANAGEMENT | 85775 | 152557 | 151944 | 151944 | 124986 | 152557 | 151944 | 100479 | | | 1072188 |
| 30805 | 3.8.5 STAKEHOLDER INVOLVEMENT | 89288 | 158806 | 158168 | 47833 | | | | | | | 454096 |
| TOTAL | L | 18915808 | 14911440 | 17468774 | 26392548 | 28106922 | 33365812 | 33098952 | 20833168 | | | 193093424 |
| | REPORT TOTAL | 20771418 | 42902648 | 50179676 | 36023704 | 32793726 | 38835152 | 38546328 | 24235752 | | | 284288384 |

RFETS | PRIMAVERA PROJECT PLANNER | INTEGRATED SITE SCHEDULE

REPORT DATE 07MAR95 RUN NO. 437 | COST LOADING REPORT | START DATE 01AUG94 FIN DATE 25MAR44
14:36
DATA DATE 01OCT94 PAGE NO. 1

Total Cost - Lvl 2 - Liquid Stabilization | TOTAL USAGE FOR YEAR

| ACT ID | DESC | FY 1995 | FY 1996 | FY 1997 | FY 1998 | FY 1999 | FY 2000 | FY 2001 | FY 2002 | FY 2003 | FY 2004 | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C - NONLABOR | | | | | | | | | | | | |
| 40802 | 8.2 Buildng Readiness | 225000 | | | | | | | | | | 225000 |
| TOTAL | C | 225000 | | | | | | | | | | 225000 |
| E - NLABEXPS | | | | | | | | | | | | |
| 40301 | 3.1 B371 CAUSTIC WASTE TREATMENT SYSTEM | 334747 | 36806 | | | | | | | | | 371553 |
| 40302 | 3.2 B371 TANK DRAINING | 38091 | 256964 | | | | | | | | | 295055 |
| 40303 | 3.3 B371 ROOM DRAINING | 288738 | 302277 | 361613 | 409149 | 163607 | | | | | | 1525384 |
| 40309 | 3.9 B371 PROGRAM MANAGEMENT/OTHER | 586704 | 571858 | 569561 | 569561 | 321526 | | | | | | 2619210 |
| 40701 | 7.1 HYDROXIDE PRECIPITATION | 486422 | 118985 | | | | | | | | | 605407 |
| 40703 | 7.3 B771 TANK DRAINING | 435269 | | | | | | | | | | 435269 |
| 40704 | 7.4 B771 ROOM DRAINING | 2782 | 2805 | 101 | | | | | | | | 5688 |
| 40705 | 7.5 B771 RESIN REMOVAL | 22660 | | | | | | | | | | 22660 |
| 40707 | 7.7 PROGRAM SUPPORT | 1345863 | 1121869 | 1117363 | 261319 | | | | | | | 3846414 |
| 40801 | 8.1 Option Decision | 9000 | | | | | | | | | | 9000 |
| 40802 | 8.2 Buildng Readiness | 1205405 | 206217 | | | | | | | | | 1411622 |
| 40804 | 8.4 Safety Envelope | 459037 | 28436 | | | | | | | | | 487473 |
| 40805 | 8.5 Readiness Review | | 305904 | | | | | | | | | 305904 |
| 40806 | 8.6 Solution Removal | | 5468948 | 7918728 | | | | | | | | 13387675 |
| TOTAL | E | 5214719 | 8421068 | 9967366 | 1240029 | 485134 | | | | | | 25328314 |
| L - LABOR | | | | | | | | | | | | |
| 40301 | 3.1 B371 CAUSTIC WASTE TREATMENT SYSTEM | 1409780 | 324714 | | | | | | | | | 1734495 |
| 40302 | 3.2 B371 TANK DRAINING | 149940 | 790054 | | | | | | | | | 939994 |
| 40303 | 3.3 B371 ROOM DRAINING | 1663787 | 3681290 | 6194656 | 4863046 | 1082017 | | | | | | 17484794 |
| 40309 | 3.9 B371 PROGRAM MANAGEMENT/OTHER | 2435370 | 2299790 | 2216228 | 2215069 | 1250442 | | | | | | 10416898 |
| 40701 | 7.1 HYDROXIDE PRECIPITATION | 1931464 | 334616 | | | | | | | | | 2266080 |
| 40702 | 7.2 B771 OXALATE PRECIPITATION | 698933 | 1494754 | 1999802 | 438135 | | | | | | | 4631624 |
| 40703 | 7.3 B771 TANK DRAINING | 2611076 | 138507 | | | | | | | | | 2749584 |
| 40704 | 7.4 B771 ROOM DRAINING | 2648915 | 6104662 | 3264015 | 157877 | | | | | | | 12175468 |
| 40705 | 7.5 B771 RESIN REMOVAL | 547604 | | | | | | | | | | 547604 |
| 40706 | 7.6 B771 CARRIER PRECIPITATION RESTART | 89248 | | | | | | | | | | 89248 |
| 40707 | 7.7 PROGRAM SUPPORT | 7323996 | 6574974 | 6548568 | 1531520 | | | | | | | 21979056 |
| 40801 | 8.1 Option Decision | 104325 | | | | | | | | | | 104325 |
| 40802 | 8.2 Buildng Readiness | 2007194 | 113429 | | | | | | | | | 2120623 |
| 40804 | 8.4 Safety Envelope | 615943 | 10223 | | | | | | | | | 626166 |
| 40805 | 8.5 Readiness Review | | 244200 | | | | | | | | | 244200 |
| 40806 | 8.6 Solution Removal | 64361 | 371424 | 377037 | | | | | | | | 812821 |
| TOTAL | L | 24301936 | 22482636 | 20600304 | 9205646 | 2332460 | | | | | | 78922984 |
| | REPORT TOTAL | 29741654 | 30903704 | 30567670 | 10445675 | 2817593 | | | | | | 104476296 |

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RFETS | PRIMAVERA PROJECT PLANNER | INTEGRATED SITE SCHEDULE

REPORT DATE 07MAR95 RUN NO. 438
17:26

COST LOADING REPORT

START DATE 01AUG94 FIN DATE 25MAR44

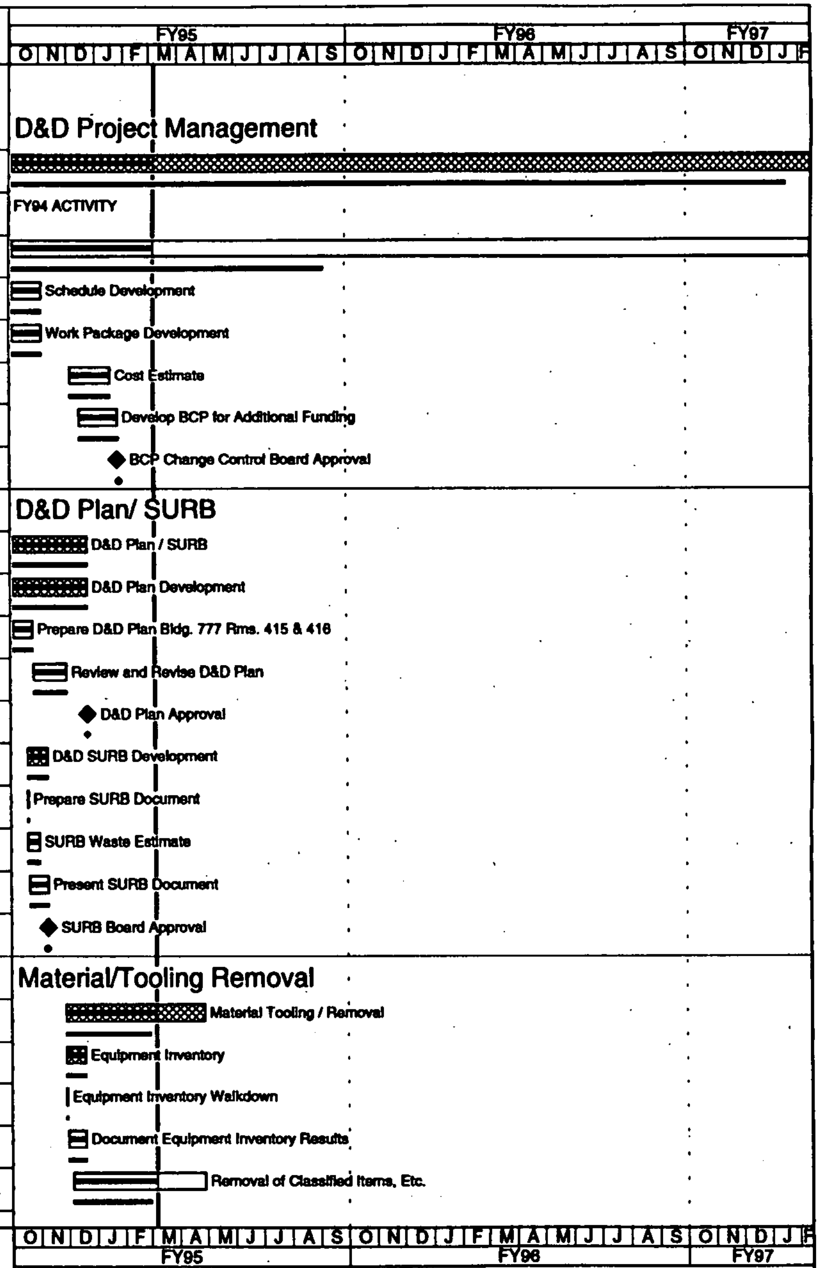
DATA DATE 01OCT94 PAGE NO. 1

Total Cost - Lvl 2 - Excess Material

TOTAL USAGE FOR YEAR

| ACT ID | DESC | FY 1995 | FY 1996 | FY 1997 | FY 1998 | FY 1999 | FY 2000 | FY 2001 | FY 2002 | FY 2003 | FY 2004 | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| E - NLABEXPS | | | | | | | | | | | | |
| 70506 | SNM Offsite Shipments | 1179561 | 1189112 | 1184336 | 1184336 | 262655 | | | | | | 5000000 |
| TOTAL | E | 1179561 | 1189112 | 1184336 | 1184336 | 262655 | | | | | | 5000000 |
| | REPORT TOTAL | 1179561 | 1189112 | 1184336 | 1184336 | 262655 | | | | | | 5000000 |

| ACTIVITY ID | ACTIVITY DESCRIPTION | ORIG DUR | REM DUR | EARLY START | EARLY FINISH |
|---|---|---|---|---|---|
| | **D&D Project Management** | | | | |
| A1 0 | D&D of Building 777, Rms. 415/416 | 587 | 484 | 3OCT94A | 13FEB97 |
| A1 1 | FY94 ACTIVITY | 100 | 0 | 25APR94A | 30SEP94A |
| A1 44 | D&D Project Management Bldg. 777 Rms. 415/416 | 587 | 484 | 3OCT94A | 13FEB97 |
| A1 46 | Schedule Development | 25 | 0 | 3OCT94A | 4NOV94A |
| A1 47 | Work Package Development | 25 | 0 | 3OCT94A | 4NOV94A |
| A1 48 | Cost Estimate | 10 | 0 | 5DEC94A | 18JAN95A |
| A1 49 | Develop BCP for Additional Funding | 10 | 0 | 15DEC94A | 26JAN95A |
| A1 51 | BCP Change Control Board Approval | 0 | 0 | | 26JAN95A |
| | **D&D Plan/ SURB** | | | | |
| A1 10 | D&D Plan / SURB | 58 | 0 | 3OCT94A | 23DEC94A |
| A1 99 | D&D Plan Development | 58 | 0 | 3OCT94A | 23DEC94A |
| A1 100 | Prepare D&D Plan Bldg. 777 Rms. 415 & 416 | 16 | 0 | 3OCT94A | 24OCT94A |
| A1 101 | Review and Revise D&D Plan | 18 | 0 | 25OCT94A | 30NOV94A |
| A1 103 | D&D Plan Approval | 0 | 0 | | 23DEC94A |
| A1 104 | D&D SURB Development | 17 | 0 | 18OCT94A | 9NOV94A |
| A1 105 | Prepare SURB Document | 2 | 0 | 18OCT94A | 19OCT94A |
| A1 106 | SURB Waste Estimate | 10 | 0 | 18OCT94A | 31OCT94A |
| A1 110 | Present SURB Document | 15 | 0 | 20OCT94A | 9NOV94A |
| A1 115 | SURB Board Approval | 0 | 0 | | 9NOV94A |
| | **Material/Tooling Removal** | | | | |
| A1 60 | Material Tooling / Removal | 103 | 38 | 28NOV94A | 28APR95 |
| A1 359 | Equipment Inventory | 16 | 0 | 28NOV94A | 19DEC94A |
| A1 360 | Equipment Inventory Walkdown | 2 | 0 | 28NOV94A | 29NOV94A |
| A1 365 | Document Equipment Inventory Results | 5 | 0 | 30NOV94A | 19DEC94A |
| A1 415 | Removal of Classified Items, Etc. | 33 | 38 | 5DEC94A | 28APR95 |




Activity Classification: ACTIVITY TYPE
HAMMOCK MILESTONE

| | |
|---|---|
| Target Date | 24JAN95 |
| Plot Date | 14MAR95 |
| Data Date | 7MAR95 |
| Project Start | 1AUG88 |
| Project Finish | 13FEB97 |



Activity Bar/Early Dates
Critical Activity
Progress Bar
Target Dates
Milestone/Flag Activity

MP01

Sheet 1 of 10

**EG&G R.F.E.T.S., Inc**
**Bldg. 777 Rm. 415/416, Met. Lab**
**Work Package #13002 Total Project**

Plot date: 14MAR95 Statused through: 06MAR95

| Date | Revision | Checked | Approved |
|---|---|---|---|
| | | | |

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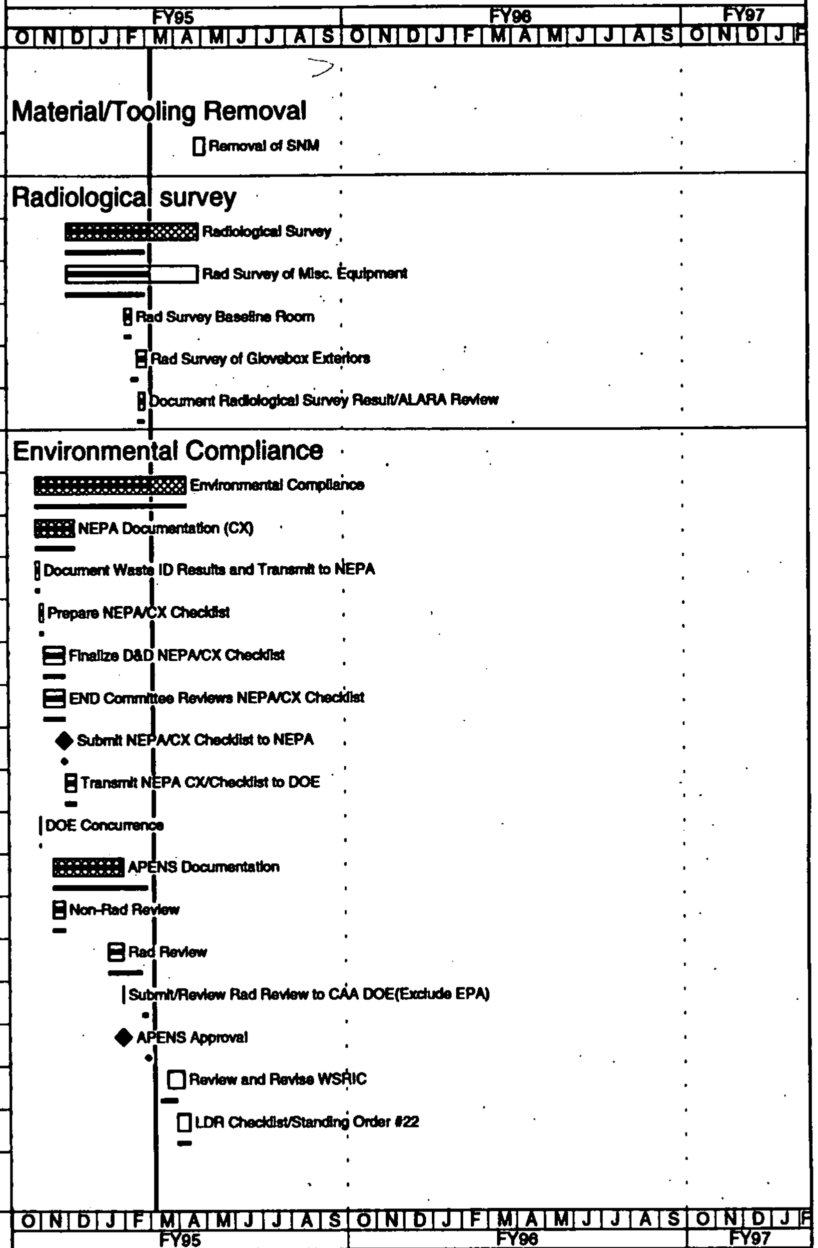
| ACTIVITY ID | ACTIVITY DESCRIPTION | ORIG DUR | REM DUR | EARLY START | EARLY FINISH |
|---|---|---|---|---|---|
| | **Material/Tooling Removal** | | | | |
| A1 416 | Removal of SNM | 10 | 10 | 24APR95 | 5MAY95 |
| | **Radiological survey** | | | | |
| A1 90 | Radiological Survey | 98 | 38 | 5DEC94A | 28APR95 |
| A1 305 | Rad Survey of Misc. Equipment | 33 | 38 | 5DEC94A | 28APR95 |
| A1 307 | Rad Survey Baseline Room | 5 | 0 | 7FEB95A | 14FEB95A |
| A1 310 | Rad Survey of Glovebox Exteriors | 5 | 0 | 20FEB95A | 2MAR95A |
| A1 320 | Document Radiological Survey Result/ALARA Review | 5 | 0 | 22FEB95A | 28FEB95A |
| | **Environmental Compliance** | | | | |
| A1 70 | Environmental Compliance | 111 | 28 | 31OCT94A | 13APR95 |
| A1 380 | NEPA Documentation (CX) | 29 | 0 | 31OCT94A | 12DEC94A |
| A1 375 | Document Waste ID Results and Transmit to NEPA | 4 | 0 | 31OCT94A | 3NOV94A |
| A1 381 | Prepare NEPA/CX Checklist | 2 | 0 | 4NOV94A | 7NOV94A |
| A1 384 | Finalize D&D NEPA/CX Checklist | 15 | 0 | 8NOV94A | 30NOV94A |
| A1 386 | END Committee Reviews NEPA/CX Checklist | 15 | 0 | 8NOV94A | 30NOV94A |
| A1 385 | Submit NEPA/CX Checklist to NEPA | 0 | 0 | | 30NOV94A |
| A1 387 | Transmit NEPA CX/Checklist to DOE | 7 | 0 | 1DEC94A | 12DEC94A |
| A1 388 | DOE Concurrence | 10 | 0 | 3NOV94A | 3NOV94A |
| A1 390 | APENS Documentation | 47 | 0 | 17NOV94A | 1FEB95A |
| A1 391 | Non-Rad Review | 12 | 0 | 17NOV94A | 29NOV94A |
| A1 392 | Rad Review | 27 | 0 | 16JAN95A | 1FEB95A |
| A1 393 | Submit/Review Rad Review to CAA DOE(Exclude EPA) | 4 | 0 | 1FEB95A | 1FEB95A |
| A1 394 | APENS Approval | 0 | 0 | | 1FEB95A |
| A1 431 | Review and Revise WSRIC | 14 | 14 | 21MAR95 | 7APR95 |
| A1 430 | LDR Checklist/Standing Order #22 | 10 | 10 | 31MAR95 | 13APR95 |




Activity Classification: ACTIVITY TYPE
HAMMOCK
MILESTONE

Target Date 24JAN95
Plot Date 14MAR95
Data Date 7MAR95
Project Start 1AUG88
Project Finish 13FEB97


Activity Bar/Early Dates
Critical Activity
Progress Bar
Target Dates
Milestone/Flag Activity

MP01

Sheet 2 of 10

**EG&G R.F.E.T.S., Inc**
**Bldg. 777 Rm. 415/416, Met. Lab**
**Work Package #13002 Total Project**

Plot date: 14MAR95 Statused through: 06MAR95

| Date | Revision | Checked | Approved |
|---|---|---|---|
| | | | |

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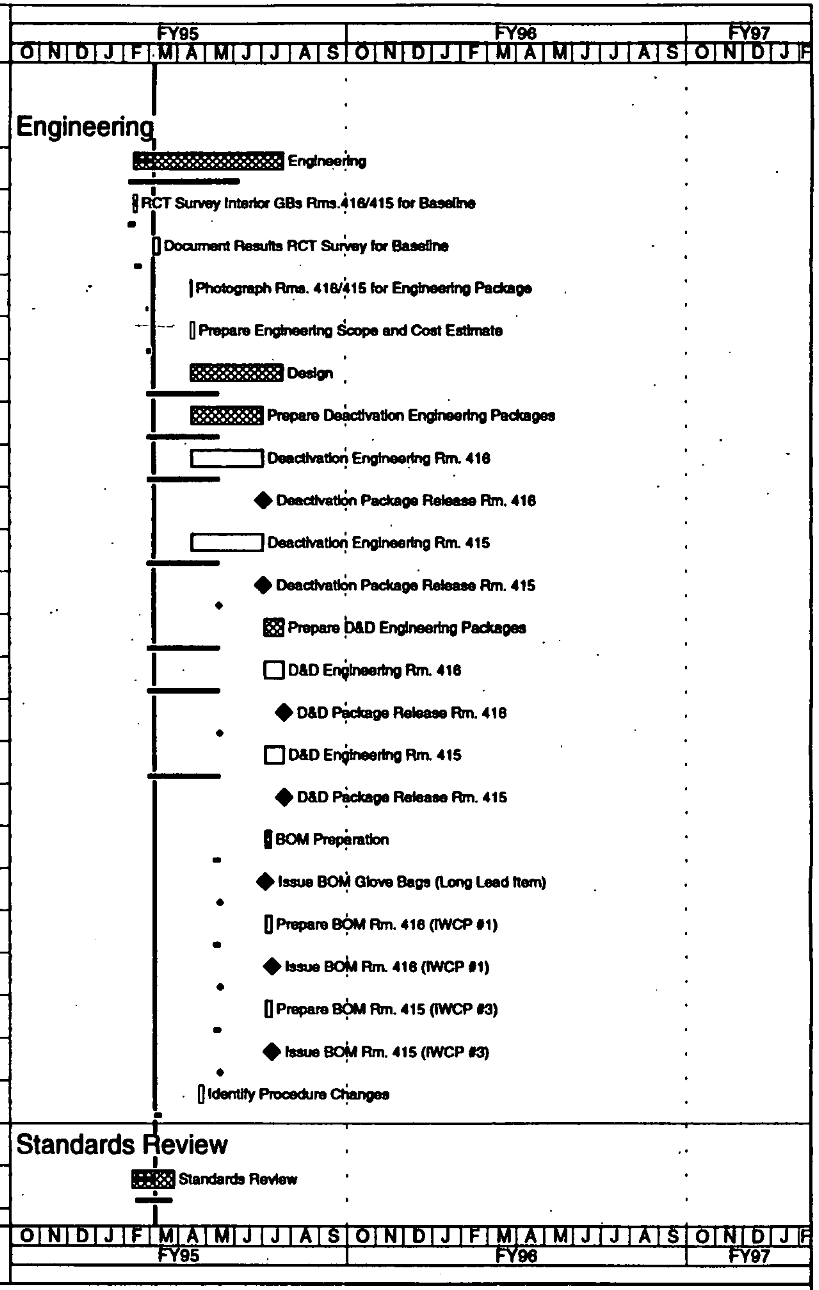
| ACTIVITY ID | ACTIVITY DESCRIPTION | ORIG DUR | REM DUR | EARLY START | EARLY FINISH |
|---|---|---|---|---|---|
| **Engineering** | | | | | |
| A1 30 | Engineering | 114 | 98 | 13FEB95A | 25JUL95 |
| A1 421 | RCT Survey Interior GBs Rms.416/415 for Baseline | 5 | 0 | 13FEB95A | 16FEB95A |
| A1 422 | Document Results RCT Survey for Baseline | 5 | 5 | 7MAR95 | 13MAR95 |
| A1 420 | Photograph Rms. 416/415 for Engineering Package | 1 | 1 | 17APR95 | 17APR95 |
| A1 425 | Prepare Engineering Scope and Cost Estimate | 4 | 4 | 17APR95 | 20APR95 |
| A1 424 | Design | 70 | 70 | 17APR95 | 25JUL95 |
| A1 416425 | Prepare Deactivation Engineering Packages | 55 | 55 | 17APR95 | 3JUL95 |
| A1 416820 | Deactivation Engineering Rm. 416 | 55 | 55 | 17APR95 | 3JUL95 |
| A1 416821 | Deactivation Package Release Rm. 416 | 0 | 0 | | 3JUL95 |
| A1 415996 | Deactivation Engineering Rm. 415 | 55 | 55 | 17APR95 | 3JUL95 |
| A1 415999 | Deactivation Package Release Rm. 415 | 0 | 0 | | 3JUL95 |
| A1 415994 | Prepare D&D Engineering Packages | 15 | 15 | 5JUL95 | 25JUL95 |
| A1 416824 | D&D Engineering Rm. 416 | 15 | 15 | 5JUL95 | 25JUL95 |
| A1 416435 | D&D Package Release Rm. 416 | 0 | 0 | | 25JUL95 |
| A1 415997 | D&D Engineering Rm. 415 | 15 | 15 | 5JUL95 | 25JUL95 |
| A1 415989 | D&D Package Release Rm. 415 | 0 | 0 | | 25JUL95 |
| A1 4521 | BOM Preparation | 5 | 5 | 5JUL95 | 11JUL95 |
| A1 6651 | Issue BOM Glove Bags (Long Lead Item) | 0 | 0 | 5JUL95 | |
| A1 6511 | Prepare BOM Rm. 416 (IWCP #1) | 5 | 5 | 5JUL95 | 11JUL95 |
| A1 6521 | Issue BOM Rm. 416 (IWCP #1) | 0 | 0 | | 11JUL95 |
| A1 651 | Prepare BOM Rm. 415 (IWCP #3) | 5 | 5 | 5JUL95 | 11JUL95 |
| A1 652 | Issue BOM Rm. 415 (IWCP #3) | 0 | 0 | | 11JUL95 |
| A1 455 | Identify Procedure Changes | 5 | 5 | 24APR95 | 28APR95 |
| **Standards Review** | | | | | |
| A1 20 | Standards Review | 32 | 15 | 10FEB95A | 27MAR95 |




Activity Classification: ACTIVITY TYPE
HAMMOCK
MILESTONE

Target Date 24JAN95
Plot Date 14MAR95
Data Date 7MAR95
Project Start 1AUG88
Project Finish 13FEB97

Activity Bar/Early Dates
Critical Activity
Progress Bar
Target Dates
Milestone/Flag Activity

MP01

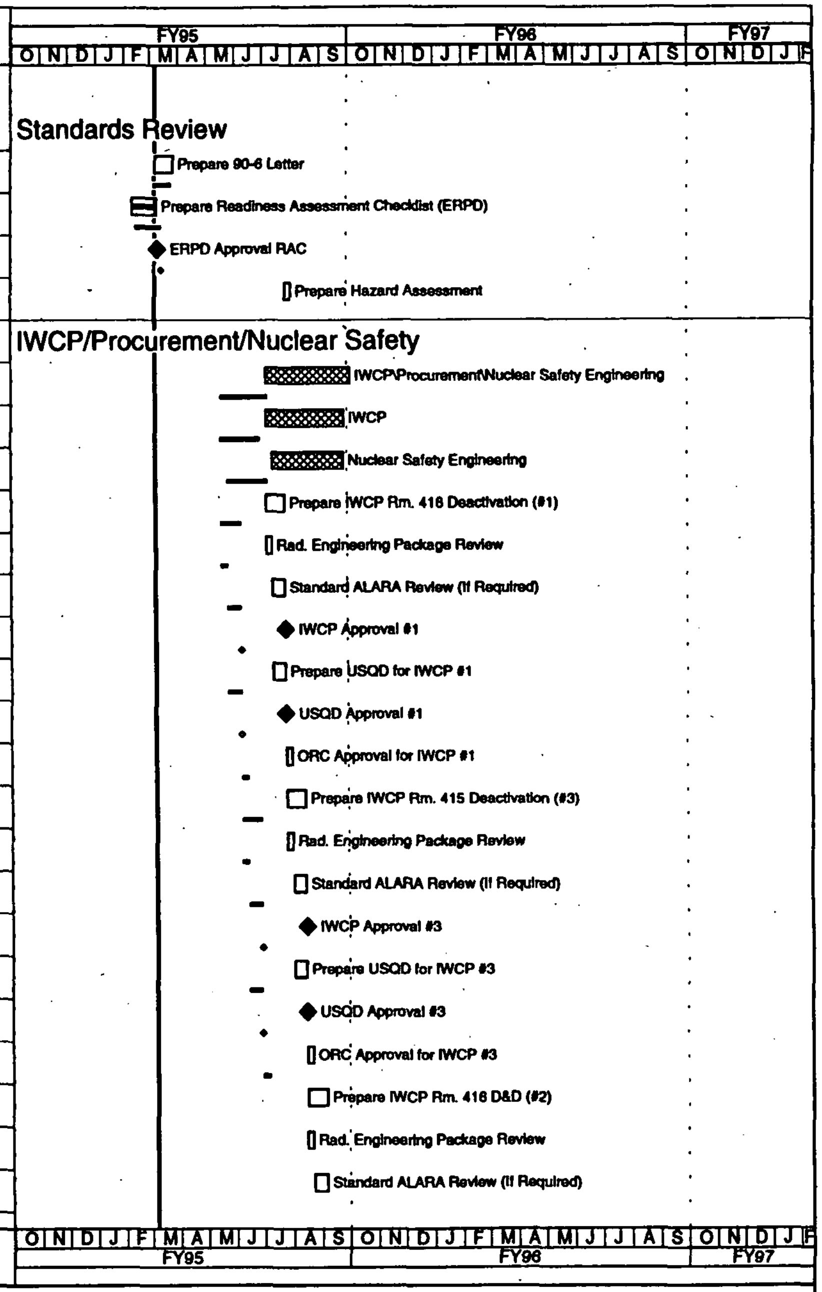
Sheet 3 of 10

**EG&G R.F.E.T.S., Inc**
**Bldg. 777 Rm. 415/416, Met. Lab**
**Work Package #13002 Total Project**

Plot date: 14MAR95 Statused through: 06MAR95

| Date | Revision | Checked | Approved |
|---|---|---|---|
| | | | |

| ACTIVITY ID | ACTIVITY DESCRIPTION | ORIG DUR | REM DUR | EARLY START | EARLY FINISH |
|---|---|---|---|---|---|
| | **Standards Review** | | | | |
| A1 120 | Prepare 90-6 Letter | 15 | 15 | 7MAR95 | 27MAR95 |
| A1 432 | Prepare Readiness Assessment Checklist (ERPD) | 20 | 3 | 10FEB95A | 9MAR95 |
| A1 433 | ERPD Approval RAC | 0 | 0 | | 9MAR95 |
| A1 434 | Prepare Hazard Assessment | 5 | 5 | 26JUL95 | 1AUG95 |
| | **IWCP/Procurement/Nuclear Safety** | | | | |
| A1 39 | IWCP\Procurement\Nuclear Safety Engineering | 65 | 65 | 5JUL95 | 4OCT95 |
| A1 40 | IWCP | 60 | 60 | 5JUL95 | 27SEP95 |
| A1 439 | Nuclear Safety Engineering | 55 | 55 | 12JUL95 | 27SEP95 |
| A1 6501 | Prepare IWCP Rm. 416 Deactivation (#1) | 15 | 15 | 5JUL95 | 25JUL95 |
| A1 661 | Rad. Engineering Package Review | 5 | 5 | 5JUL95 | 11JUL95 |
| A1 662 | Standard ALARA Review (If Required) | 10 | 10 | 12JUL95 | 25JUL95 |
| A1 6561 | IWCP Approval #1 | 0 | 0 | | 25JUL95 |
| A1 440 | Prepare USQD for IWCP #1 | 10 | 10 | 12JUL95 | 25JUL95 |
| A1 450 | USQD Approval #1 | 0 | 0 | | 25JUL95 |
| A1 445 | ORC Approval for IWCP #1 | 5 | 5 | 26JUL95 | 1AUG95 |
| A1 650 | Prepare IWCP Rm. 415 Deactivation (#3) | 15 | 15 | 26JUL95 | 15AUG95 |
| A1 694 | Rad. Engineering Package Review | 5 | 5 | 26JUL95 | 1AUG95 |
| A1 663 | Standard ALARA Review (If Required) | 10 | 10 | 2AUG95 | 15AUG95 |
| A1 656 | IWCP Approval #3 | 0 | 0 | | 15AUG95 |
| A1 456 | Prepare USQD for IWCP #3 | 10 | 10 | 2AUG95 | 15AUG95 |
| A1 457 | USQD Approval #3 | 0 | 0 | | 15AUG95 |
| A1 458 | ORC Approval for IWCP #3 | 5 | 5 | 16AUG95 | 22AUG95 |
| A1 700 | Prepare IWCP Rm. 416 D&D (#2) | 15 | 15 | 16AUG95 | 6SEP95 |
| A1 701 | Rad. Engineering Package Review | 5 | 5 | 16AUG95 | 22AUG95 |
| A1 702 | Standard ALARA Review (If Required) | 10 | 10 | 23AUG95 | 6SEP95 |




Activity Classification: ACTIVITY TYPE
HAMMOCK
MILESTONE

| | |
|---|---|
| Target Date | 24JAN95 |
| Plot Date | 14MAR95 |
| Data Date | 7MAR95 |
| Project Start | 1AUG88 |
| Project Finish | 13FEB97 |



Activity Bar/Early Dates
Critical Activity
Progress Bar
Target Dates
Milestone/Flag Activity

MP01

Sheet 4 of 10

**EG&G R.F.E.T.S., Inc**
**Bldg. 777 Rm. 415/416, Met. Lab**
**Work Package #13002 Total Project**

Plot date: 14MAR95 Statused through: 06MAR95

| Date | Revision | Checked | Approved |
|---|---|---|---|
| | | | |

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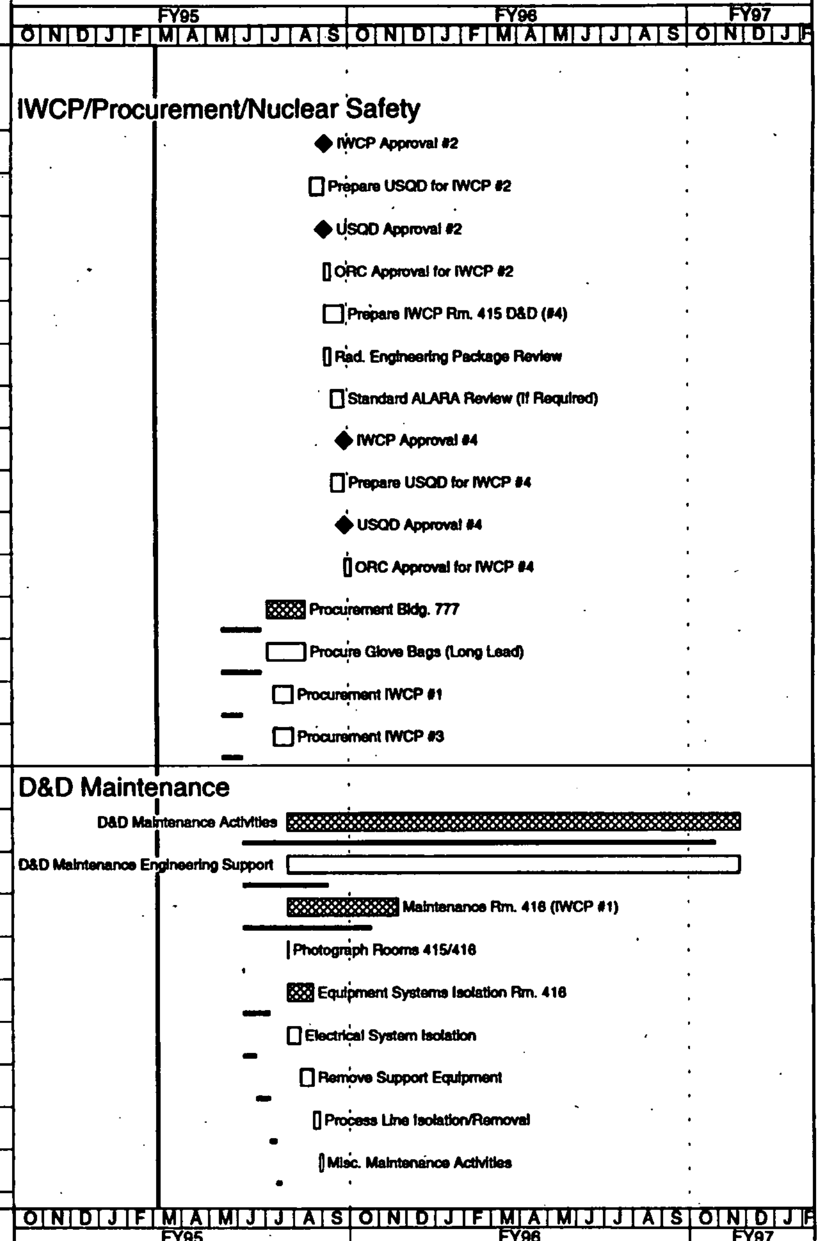
| ACTIVITY ID | ACTIVITY DESCRIPTION | ORIG DUR | REM DUR | EARLY START | EARLY FINISH |
|---|---|---|---|---|---|
| A1 703 | IWCP Approval #2 | 0 | 0 | | 6SEP95 |
| A1 704 | Prepare USQD for IWCP #2 | 10 | 10 | 23AUG95 | 6SEP95 |
| A1 705 | USQD Approval #2 | 0 | 0 | | 6SEP95 |
| A1 706 | ORC Approval for IWCP #2 | 5 | 5 | 7SEP95 | 13SEP95 |
| A1 710 | Prepare IWCP Rm. 415 D&D (#4) | 15 | 15 | 7SEP95 | 27SEP95 |
| A1 711 | Rad. Engineering Package Review | 5 | 5 | 7SEP95 | 13SEP95 |
| A1 712 | Standard ALARA Review (If Required) | 10 | 10 | 14SEP95 | 27SEP95 |
| A1 713 | IWCP Approval #4 | 0 | 0 | | 27SEP95 |
| A1 714 | Prepare USQD for IWCP #4 | 10 | 10 | 14SEP95 | 27SEP95 |
| A1 715 | USQD Approval #4 | 0 | 0 | | 27SEP95 |
| A1 716 | ORC Approval for IWCP #4 | 5 | 5 | 28SEP95 | 4OCT95 |
| A1 4511 | Procurement Bldg. 777 | 30 | 30 | 5JUL95 | 15AUG95 |
| A1 6671 | Procure Glove Bags (Long Lead) | 30 | 30 | 5JUL95 | 15AUG95 |
| A1 6531 | Procurement IWCP #1 | 15 | 15 | 12JUL95 | 1AUG95 |
| A1 653 | Procurement IWCP #3 | 15 | 15 | 12JUL95 | 1AUG95 |
| A1 50 | D&D Maintenance Activities | 338 | 338 | 26JUL95 | 25NOV96 |
| A1 416478 | D&D Maintenance Engineering Support and Supplies | 338 | 338 | 26JUL95 | 25NOV96 |
| A1 416479 | Maintenance Rm. 416 (IWCP #1) | 85 | 85 | 26JUL95 | 22NOV95 |
| A1 579 | Photograph Rooms 415/416 | 1 | 1 | 26JUL95 | 26JUL95 |
| A1 416580 | Equipment Systems Isolation Rm. 416 | 20 | 20 | 26JUL95 | 22AUG95 |
| A1 416584 | Electrical System Isolation | 10 | 10 | 26JUL95 | 8AUG95 |
| A1 416586 | Remove Support Equipment | 10 | 10 | 9AUG95 | 22AUG95 |
| A1 416585 | Process Line Isolation/Removal | 5 | 5 | 23AUG95 | 29AUG95 |
| A1 416590 | Misc. Maintenance Activities | 3 | 3 | 30AUG95 | 1SEP95 |




Activity Classification: ACTIVITY TYPE
HAMMOCK
MILESTONE

Target Date 24JAN95
Plot Date 14MAR95
Data Date 7MAR95
Project Start 1AUG88
Project Finish 13FEB97
(c) Primavera Systems, Inc.

Activity Bar/Early Dates
Critical Activity
Progress Bar
Target Dates
Milestone/Flag Activity

MP01

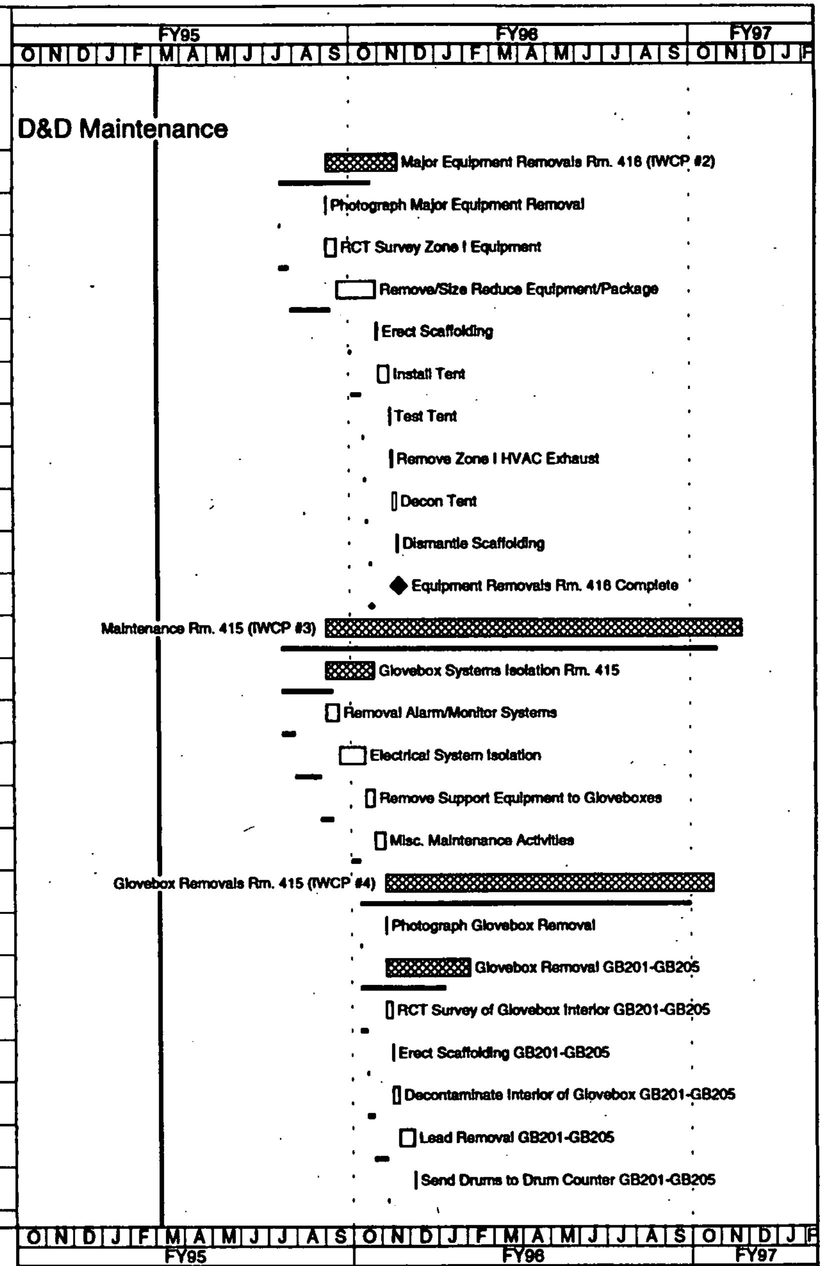
Sheet 5 of 10

**EG&G R.F.E.T.S., Inc**
**Bldg. 777 Rm. 415/416, Met. Lab**
**Work Package #13002 Total Project**

Plot date: 14MAR95 Statused through: 06MAR95

| Date | Revision | Checked | Approved |
|---|---|---|---|
| | | | |

| ACTIVITY ID | ACTIVITY DESCRIPTION | ORIG DUR | REM DUR | EARLY START | EARLY FINISH |
|---|---|---|---|---|---|
| A1 416595 | Major Equipment Removals Rm. 416 (IWCP #2) | 55 | 55 | 7SEP95 | 22NOV95 |
| A1 416699 | Photograph Major Equipment Removal | 1 | 1 | 7SEP95 | 7SEP95 |
| A1 416700 | RCT Survey Zone I Equipment | 8 | 8 | 7SEP95 | 18SEP95 |
| A1 416714 | Remove/Size Reduce Equipment/Package | 30 | 30 | 19SEP95 | 30OCT95 |
| A1 416704 | Erect Scaffolding | 2 | 2 | 31OCT95 | 1NOV95 |
| A1 416706 | Install Tent | 8 | 8 | 2NOV95 | 13NOV95 |
| A1 416708 | Test Tent | 1 | 1 | 14NOV95 | 14NOV95 |
| A1 416712 | Remove Zone I HVAC Exhaust | 2 | 2 | 15NOV95 | 16NOV95 |
| A1 416716 | Decon Tent | 2 | 2 | 17NOV95 | 20NOV95 |
| A1 416720 | Dismantle Scaffolding | 2 | 2 | 21NOV95 | 22NOV95 |
| A1 416722 | Equipment Removals Rm. 416 Complete | 0 | 0 | | 22NOV95 |
| A1 415579 | Maintenance Rm. 415 (IWCP #3) | 308 | 308 | 5SEP95 | 25NOV96 |
| A1 415580 | Glovebox Systems Isolation Rm. 415 | 38 | 38 | 5SEP95 | 26OCT95 |
| A1 415581 | Removal Alarm/Monitor Systems | 10 | 10 | 5SEP95 | 18SEP95 |
| A1 415584 | Electrical System Isolation | 20 | 20 | 19SEP95 | 16OCT95 |
| A1 415586 | Remove Support Equipment to Gloveboxes | 8 | 8 | 17OCT95 | 26OCT95 |
| A1 415583 | Misc. Maintenance Activities | 7 | 7 | 27OCT95 | 6NOV95 |
| A1 415980 | Glovebox Removals Rm. 415 (IWCP #4) | 242 | 242 | 7NOV95 | 25OCT96 |
| A1 415981 | Photograph Glovebox Removal | 1 | 1 | 7NOV95 | 7NOV95 |
| A1 415250 | Glovebox Removal GB201-GB205 | 57 | 57 | 7NOV95 | 5FEB96 |
| A1 415255 | RCT Survey of Glovebox Interior GB201-GB205 | 5 | 5 | 7NOV95 | 13NOV95 |
| A1 415275 | Erect Scaffolding GB201-GB205 | 1 | 1 | 14NOV95 | 14NOV95 |
| A1 415260 | Decontaminate Interior of Glovebox GB201-GB205 | 5 | 5 | 14NOV95 | 20NOV95 |
| A1 415265 | Lead Removal GB201-GB205 | 10 | 10 | 21NOV95 | 6DEC95 |
| A1 415270 | Send Drums to Drum Counter GB201-GB205 | 1 | 1 | 7DEC95 | 7DEC95 |




Activity Classification: ACTIVITY TYPE
HAMMOCK
MILESTONE

Target Date 24JAN95
Plot Date 14MAR95
Data Date 7MAR95
Project Start 1AUG88
Project Finish 13FEB97
(c) Primavera Systems, Inc.

Activity Bar/Early Dates
Critical Activity
Progress Bar
Target Dates
Milestone/Flag Activity

MP01

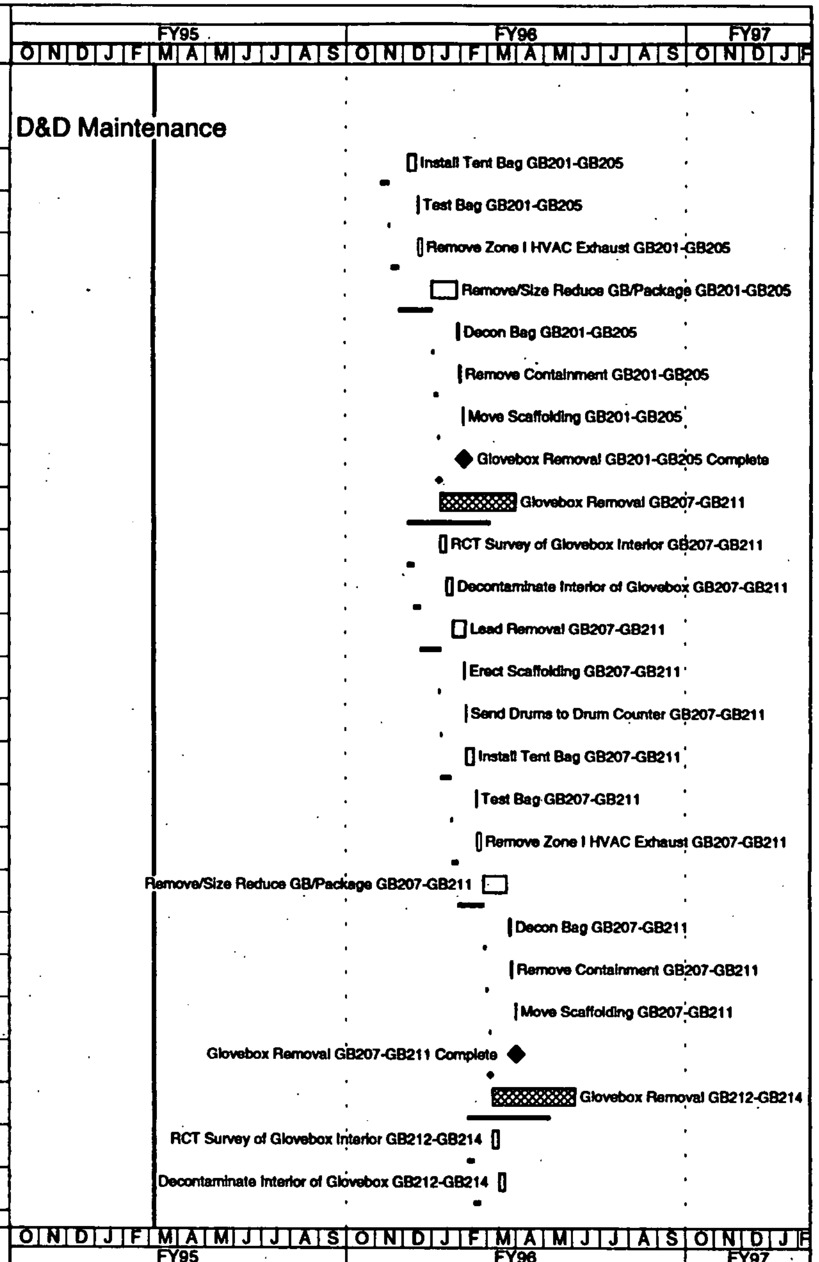
Sheet 6 of 10

EG&G R.F.E.T.S., Inc
Bldg. 777 Rm. 415/416, Met. Lab
Work Package #13002 Total Project

Plot date: 14MAR95 Statused through: 06MAR95

| Date | Revision | Checked | Approved |
|---|---|---|---|

| ACTIVITY ID | ACTIVITY DESCRIPTION | ORIG DUR | REM DUR | EARLY START | EARLY FINISH |
|---|---|---|---|---|---|
| A1 415280 | Install Tent Bag GB201-GB205 | 7 | 7 | 7DEC95 | 15DEC95 |
| A1 415285 | Test Bag GB201-GB205 | 1 | 1 | 18DEC95 | 18DEC95 |
| A1 415295 | Remove Zone I HVAC Exhaust GB201-GB205 | 4 | 4 | 19DEC95 | 22DEC95 |
| A1 415300 | Remove/Size Reduce GB/Package GB201-GB205 | 20 | 20 | 2JAN96 | 29JAN96 |
| A1 415310 | Decon Bag GB201-GB205 | 2 | 2 | 30JAN96 | 31JAN96 |
| A1 415315 | Remove Containment GB201-GB205 | 2 | 2 | 1FEB96 | 2FEB96 |
| A1 415320 | Move Scaffolding GB201-GB205 | 1 | 1 | 5FEB96 | 5FEB96 |
| A1 415325 | Glovebox Removal GB201-GB205 Complete | 0 | 0 | | 5FEB96 |
| A1 415670 | Glovebox Removal GB207-GB211 | 57 | 57 | 11JAN96 | 1APR96 |
| A1 415672 | RCT Survey of Glovebox Interior GB207-GB211 | 5 | 5 | 11JAN96 | 17JAN96 |
| A1 415674 | Decontaminate Interior of Glovebox GB207-GB211 | 5 | 5 | 18JAN96 | 24JAN96 |
| A1 415676 | Lead Removal GB207-GB211 | 10 | 10 | 25JAN96 | 7FEB96 |
| A1 415680 | Erect Scaffolding GB207-GB211 | 1 | 1 | 6FEB96 | 6FEB96 |
| A1 415678 | Send Drums to Drum Counter GB207-GB211 | 1 | 1 | 8FEB96 | 8FEB96 |
| A1 415682 | Install Tent Bag GB207-GB211 | 7 | 7 | 8FEB96 | 16FEB96 |
| A1 415684 | Test Bag GB207-GB211 | 1 | 1 | 19FEB96 | 19FEB96 |
| A1 415690 | Remove Zone I HVAC Exhaust GB207-GB211 | 4 | 4 | 20FEB96 | 23FEB96 |
| A1 415692 | Remove/Size Reduce GB/Package GB207-GB211 | 20 | 20 | 26FEB96 | 22MAR96 |
| A1 415694 | Decon Bag GB207-GB211 | 2 | 2 | 25MAR96 | 26MAR96 |
| A1 415696 | Remove Containment GB207-GB211 | 2 | 2 | 27MAR96 | 28MAR96 |
| A1 415698 | Move Scaffolding GB207-GB211 | 1 | 1 | 1APR96 | 1APR96 |
| A1 415700 | Glovebox Removal GB207-GB211 Complete | 0 | 0 | | 1APR96 |
| A1 415762 | Glovebox Removal GB212-GB214 | 62 | 62 | 7MAR96 | 4JUN96 |
| A1 415764 | RCT Survey of Glovebox Interior GB212-GB214 | 5 | 5 | 7MAR96 | 13MAR96 |
| A1 415766 | Decontaminate Interior of Glovebox GB212-GB214 | 5 | 5 | 14MAR96 | 20MAR96 |




Activity Classification: ACTIVITY TYPE
HAMMOCK
MILESTONE

| | |
|---|---|
| Target Date | 24JAN95 |
| Plot Date | 14MAR95 |
| Data Date | 7MAR95 |
| Project Start | 1AUG88 |
| Project Finish | 13FEB97 |



Activity Bar/Early Dates
Critical Activity
Progress Bar
Target Dates
Milestone/Flag Activity

MP01

Sheet 7 of 10

**EG&G R.F.E.T.S., Inc**
**Bldg. 777 Rm. 415/416, Met. Lab**
**Work Package #13002 Total Project**

Plot date: 14MAR95 Statused through: 06MAR95

| Date | Revision | Checked | Approved |
|---|---|---|---|
| | | | |

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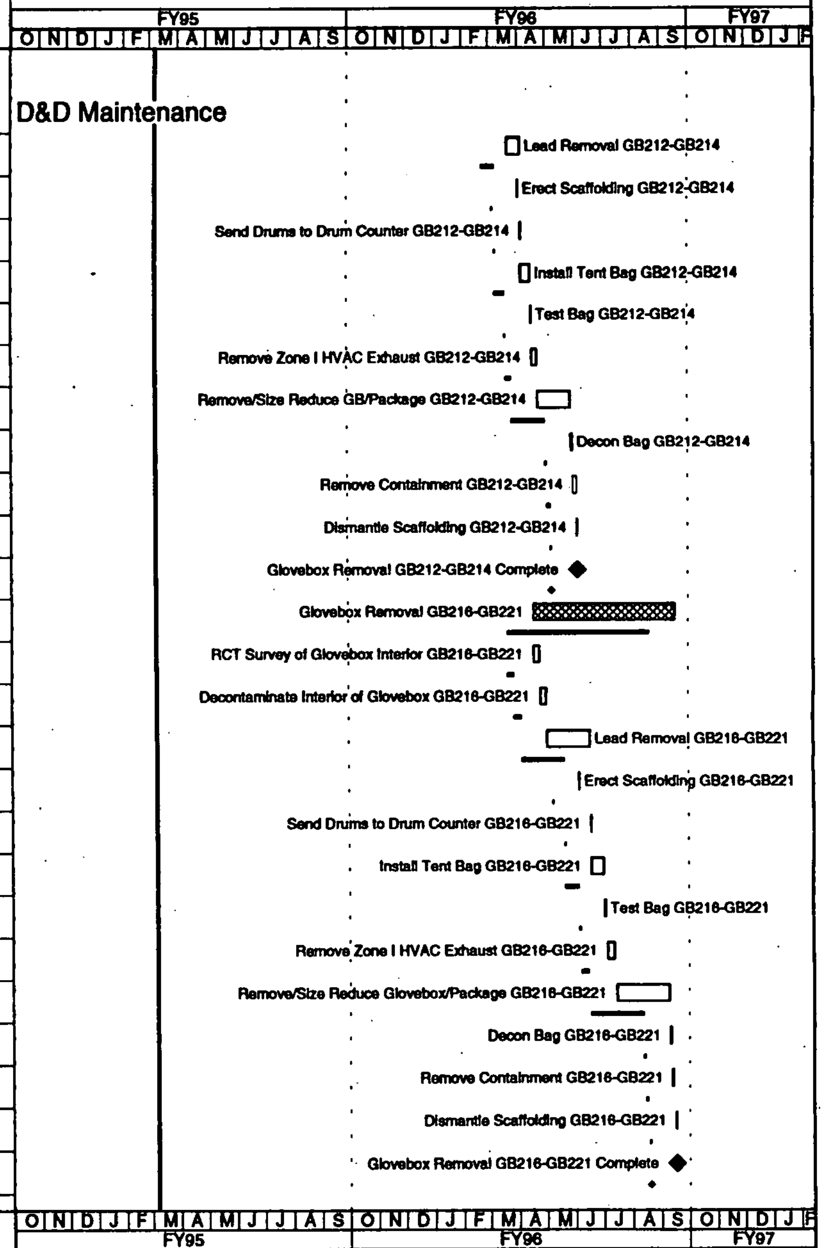
| ACTIVITY ID | ACTIVITY DESCRIPTION | ORIG DUR | REM DUR | EARLY START | EARLY FINISH |
|---|---|---|---|---|---|
| A1 415768 | Lead Removal GB212-GB214 | 10 | 10 | 21MAR96 | 4APR96 |
| A1 415772 | Erect Scaffolding GB212-GB214 | 1 | 1 | 2APR96 | 2APR96 |
| A1 415770 | Send Drums to Drum Counter GB212-GB214 | 1 | 1 | 5APR96 | 5APR96 |
| A1 415774 | Install Tent Bag GB212-GB214 | 7 | 7 | 5APR96 | 15APR96 |
| A1 415776 | Test Bag GB212-GB214 | 1 | 1 | 16APR96 | 16APR96 |
| A1 415780 | Remove Zone I HVAC Exhaust GB212-GB214 | 4 | 4 | 17APR96 | 22APR96 |
| A1 415782 | Remove/Size Reduce GB/Package GB212-GB214 | 25 | 25 | 23APR96 | 28MAY96 |
| A1 415784 | Decon Bag GB212-GB214 | 2 | 2 | 29MAY96 | 30MAY96 |
| A1 415786 | Remove Containment GB212-GB214 | 2 | 2 | 31MAY96 | 3JUN96 |
| A1 415788 | Dismantle Scaffolding GB212-GB214 | 1 | 1 | 4JUN96 | 4JUN96 |
| A1 415790 | Glovebox Removal GB212-GB214 Complete | 0 | 0 | | 4JUN96 |
| A1 415815 | Glovebox Removal GB216-GB221 | 105 | 105 | 18APR96 | 16SEP96 |
| A1 415816 | RCT Survey of Glovebox Interior GB216-GB221 | 5 | 5 | 18APR96 | 24APR96 |
| A1 415817 | Decontaminate Interior of Glovebox GB216-GB221 | 5 | 5 | 25APR96 | 1MAY96 |
| A1 415818 | Lead Removal GB216-GB221 | 32 | 32 | 2MAY96 | 17JUN96 |
| A1 415820 | Erect Scaffolding GB216-GB221 | 1 | 1 | 5JUN96 | 5JUN96 |
| A1 415819 | Send Drums to Drum Counter GB216-GB221 | 1 | 1 | 18JUN96 | 18JUN96 |
| A1 415821 | Install Tent Bag GB216-GB221 | 10 | 10 | 18JUN96 | 1JUL96 |
| A1 415822 | Test Bag GB216-GB221 | 2 | 2 | 2JUL96 | 3JUL96 |
| A1 415825 | Remove Zone I HVAC Exhaust GB216-GB221 | 6 | 6 | 5JUL96 | 12JUL96 |
| A1 415826 | Remove/Size Reduce Glovebox/Package GB216-GB221 | 40 | 40 | 15JUL96 | 9SEP96 |
| A1 415827 | Decon Bag GB216-GB221 | 2 | 2 | 10SEP96 | 11SEP96 |
| A1 415828 | Remove Containment GB216-GB221 | 2 | 2 | 12SEP96 | 13SEP96 |
| A1 415829 | Dismantle Scaffolding GB216-GB221 | 1 | 1 | 16SEP96 | 16SEP96 |
| A1 415830 | Glovebox Removal GB216-GB221 Complete | 0 | 0 | | 16SEP96 |




Activity Classification: ACTIVITY TYPE
HAMMOCK
MILESTONE

Target Date 24JAN95
Plot Date 14MAR95
Data Date 7MAR95
Project Start 1AUG88
Project Finish 13FEB97

Activity Bar/Early Dates
Critical Activity
Progress Bar
Target Dates
Milestone/Flag Activity

MP01

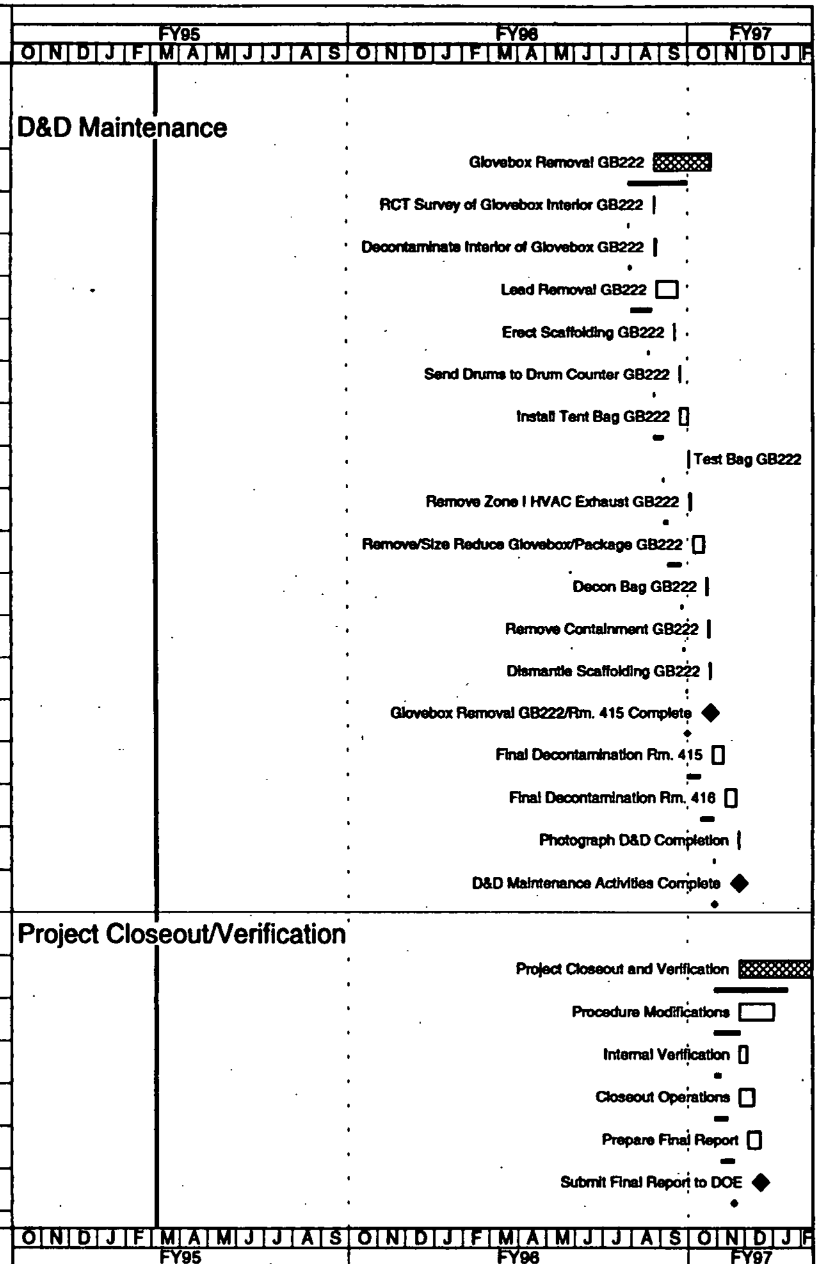
Sheet 8 of 10

EG&G R.F.E.T.S., Inc
Bldg. 777 Rm. 415/416, Met. Lab
Work Package #13002 Total Project

Plot date: 14MAR95 Statused through: 06MAR95

| Date | Revision | Checked | Approved |
|---|---|---|---|
| | | | |

| ACTIVITY ID | ACTIVITY DESCRIPTION | ORIG DUR | REM DUR | EARLY START | EARLY FINISH |
|---|---|---|---|---|---|
| A1 415906 | Glovebox Removal GB222 | 44 | 44 | 26AUG96 | 25OCT96 |
| A1 415907 | RCT Survey of Glovebox Interior GB222 | 1 | 1 | 26AUG96 | 26AUG96 |
| A1 415908 | Decontaminate Interior of Glovebox GB222 | 2 | 2 | 27AUG96 | 28AUG96 |
| A1 415909 | Lead Removal GB222 | 16 | 16 | 29AUG96 | 20SEP96 |
| A1 415911 | Erect Scaffolding GB222 | 1 | 1 | 17SEP96 | 17SEP96 |
| A1 415910 | Send Drums to Drum Counter GB222 | 1 | 1 | 23SEP96 | 23SEP96 |
| A1 415912 | Install Tent Bag GB222 | 7 | 7 | 23SEP96 | 1OCT96 |
| A1 415913 | Test Bag GB222 | 1 | 1 | 2OCT96 | 2OCT96 |
| A1 415915 | Remove Zone I HVAC Exhaust GB222 | 2 | 2 | 3OCT96 | 4OCT96 |
| A1 415916 | Remove/Size Reduce Glovebox/Package GB222 | 10 | 10 | 7OCT96 | 18OCT96 |
| A1 415917 | Decon Bag GB222 | 2 | 2 | 21OCT96 | 22OCT96 |
| A1 415918 | Remove Containment GB222 | 2 | 2 | 23OCT96 | 24OCT96 |
| A1 415919 | Dismantle Scaffolding GB222 | 1 | 1 | 25OCT96 | 25OCT96 |
| A1 415920 | Glovebox Removal GB222/Rm. 415 Complete | 0 | 0 | | 25OCT96 |
| A1 415601 | Final Decontamination Rm. 415 | 10 | 10 | 28OCT96 | 8NOV96 |
| A1 416600 | Final Decontamination Rm. 416 | 10 | 10 | 11NOV96 | 22NOV96 |
| A1 601 | Photograph D&D Completion | 1 | 1 | 25NOV96 | 25NOV96 |
| A1 602 | D&D Maintenance Activities Complete | 0 | 0 | | 25NOV96 |
| A1 900 | Project Closeout and Verification | 50 | 50 | 26NOV96 | 13FEB97 |
| A1 10000 | Procedure Modifications | 20 | 20 | 26NOV96 | 2JAN97 |
| A1 70182 | Internal Verification | 5 | 5 | 26NOV96 | 4DEC96 |
| A1 70181 | Closeout Operations | 10 | 10 | 26NOV96 | 11DEC96 |
| A1 70183 | Prepare Final Report | 10 | 10 | 5DEC96 | 18DEC96 |
| A1 70184 | Submit Final Report to DOE | 0 | 0 | | 18DEC96 |




Activity Classification: ACTIVITY TYPE
HAMMOCK
MILESTONE

Target Date 24JAN95
Plot Date 14MAR95
Data Date 7MAR95
Project Start 1AUG88
Project Finish 13FEB97



Activity Bar/Early Dates
Critical Activity
Progress Bar
Target Dates
Milestone/Flag Activity

MP01

Sheet 9 of 10

EG&G R.F.E.T.S., Inc
Bldg. 777 Rm. 415/416, Met. Lab
Work Package #13002 Total Project

Plot date: 14MAR95 Statused through: 06MAR95

| Date | Revision | Checked | Approved |
|---|---|---|---|

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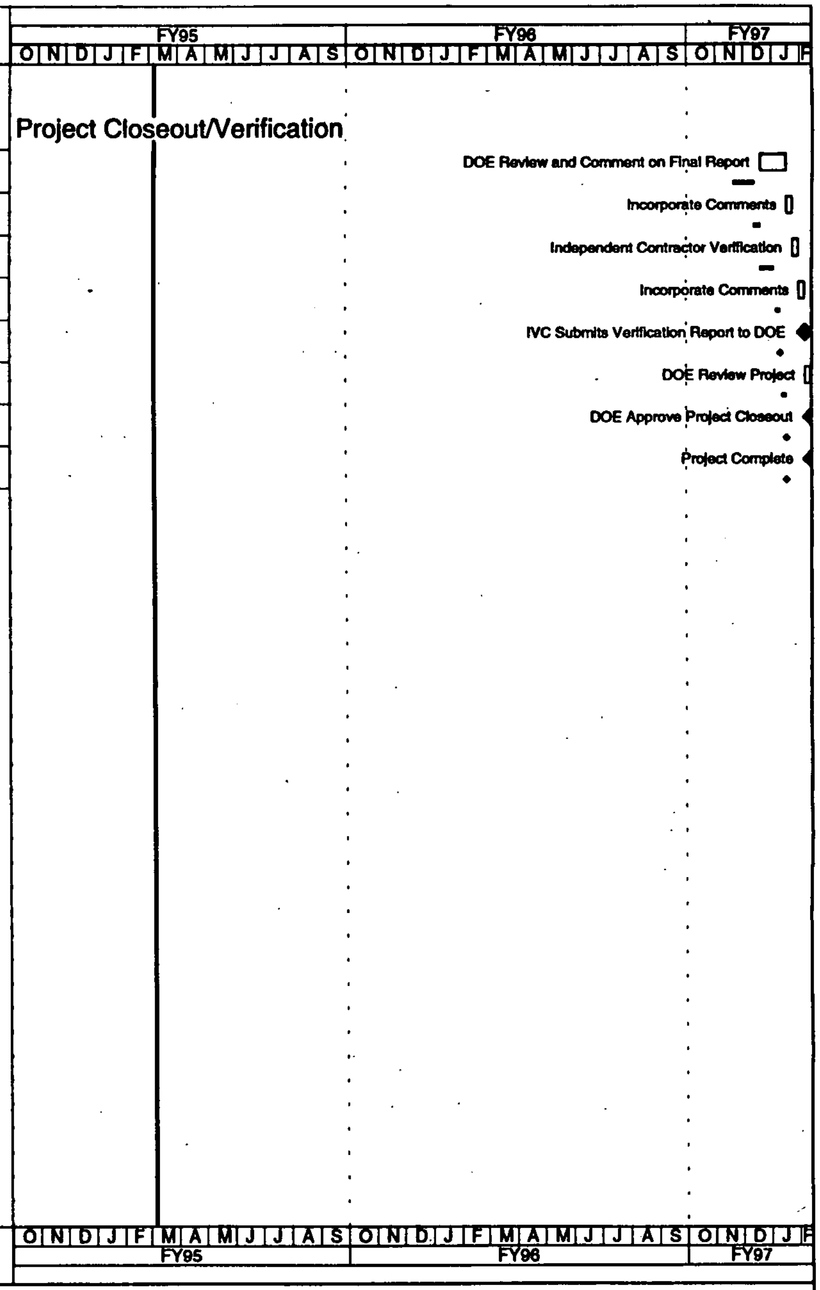
| ACTIVITY ID | ACTIVITY DESCRIPTION | ORIG DUR | REM DUR | EARLY START | EARLY FINISH |
|---|---|---|---|---|---|
| A1 70185 | DOE Review and Comment on Final Report | 15 | 15 | 19DEC96 | 16JAN97 |
| A1 70186 | Incorporate Comments | 5 | 5 | 17JAN97 | 23JAN97 |
| A1 70187 | Independent Contractor Verification | 5 | 5 | 24JAN97 | 30JAN97 |
| A1 70188 | Incorporate Comments | 5 | 5 | 31JAN97 | 6FEB97 |
| A1 70189 | IVC Submits Verification Report to DOE | 0 | 0 | | 6FEB97 |
| A1 70190 | DOE Review Project | 5 | 5 | 7FEB97 | 13FEB97 |
| A1 70191 | DOE Approve Project Closeout | 0 | 0 | | 13FEB97 |
| A1 70192 | Project Complete | 0 | 0 | | 13FEB97 |




Activity Classification: ACTIVITY TYPE
HAMMOCK
MILESTONE

| | |
|---|---|
| Target Date | 24JAN95 |
| Plot Date | 14MAR95 |
| Data Date | 7MAR95 |
| Project Start | 1AUG88 |
| Project Finish | 13FEB97 |

(c) Primavera Systems, Inc.

Activity Bar/Early Dates
Critical Activity
Progress Bar
Target Dates
Milestone/Flag Activity

MP01

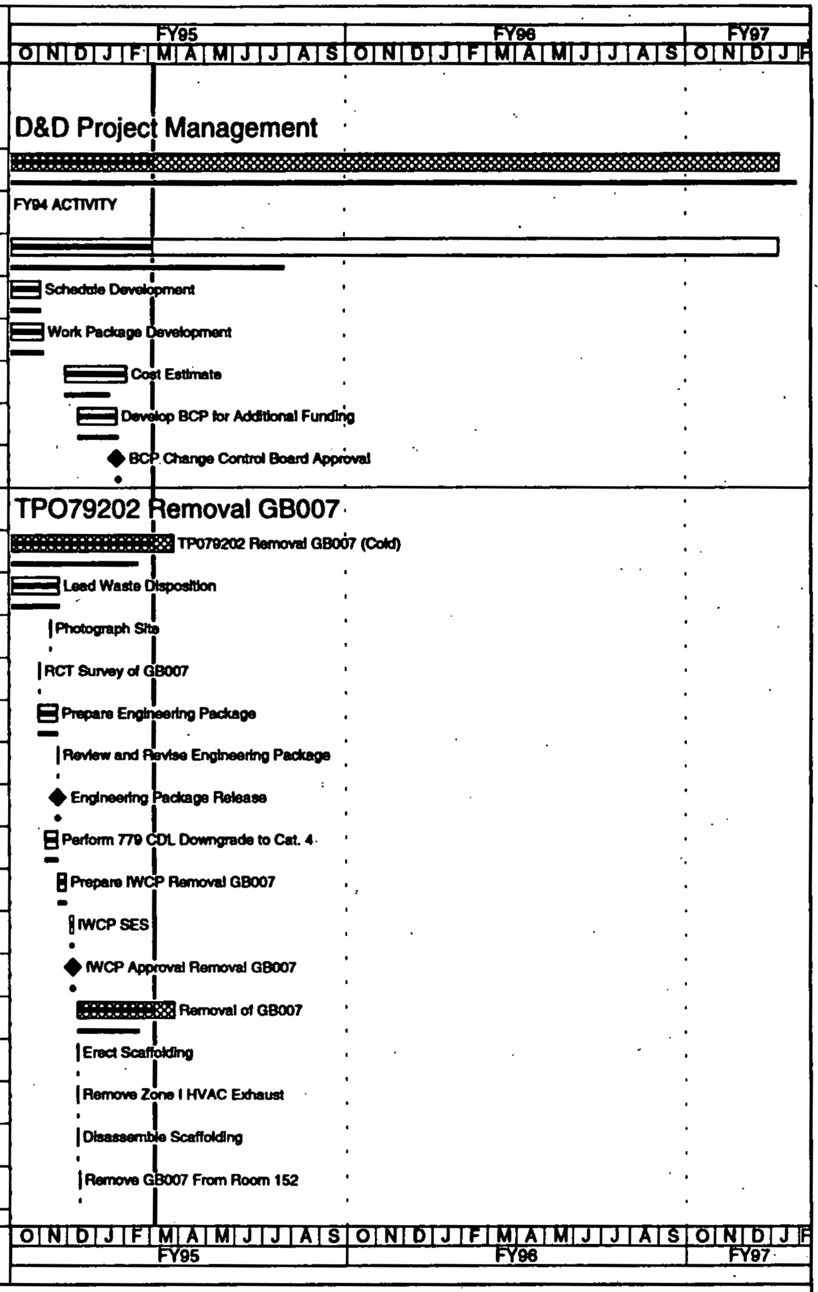
Sheet 10 of 10

EG&G R.F.E.T.S., Inc
Bldg. 777 Rm. 415/416, Met. Lab
Work Package #13002 Total Project

Plot date: 14MAR95 Statused through: 06MAR95

| Date | Revision | Checked | Approved |
|---|---|---|---|
| | | | |

| ACTIVITY ID | ACTIVITY DESCRIPTION | ORIG DUR | REM DUR | EARLY START | EARLY FINISH |
|---|---|---|---|---|---|
| A3 0 | D&D of Building 779, Rms. 152/154 | 562 | 459 | 3OCT94A | 9JAN97 |
| A3 1 | FY94 ACTIVITY | 30 | 0 | 25APR94A | 30SEP94A |
| A3 44 | D&D Project Management Bldg. 779 Rms. 152/154 | 562 | 459 | 3OCT94A | 9JAN97 |
| A3 46 | Schedule Development | 25 | 0 | 3OCT94A | 4NOV94A |
| A3 47 | Work Package Development | 26 | 0 | 3OCT94A | 7NOV94A |
| A3 48 | Cost Estimate | 10 | 0 | 1DEC94A | 6FEB95A |
| A3 49 | Develop BCP for Additional Funding | 10 | 0 | 15DEC94A | 26JAN95A |
| A3 51 | BCP Change Control Board Approval | 0 | 0 | | 26JAN95A |
| A3 75 | TP079202 Removal GB007 (Cold) | 119 | 16 | 3OCT94A | 28MAR95 |
| A3 87 | Lead Waste Disposition | 43 | 0 | 3OCT94A | 23NOV94A |
| A3 76 | Photograph Site | 1 | 0 | 14NOV94A | 14NOV94A |
| A3 86 | RCT Survey of GB007 | 1 | 0 | 2NOV94A | 2NOV94A |
| A3 77 | Prepare Engineering Package | 15 | 0 | 1NOV94A | 21NOV94A |
| A3 78 | Review and Revise Engineering Package | 1 | 0 | 22NOV94A | 22NOV94A |
| A3 79 | Engineering Package Release | 0 | 0 | | 22NOV94A |
| A3 85 | Perform 779 CDL Downgrade to Cat. 4 | 10 | 0 | 8NOV94A | 21NOV94A |
| A3 80 | Prepare IWCP Removal GB007 | 3 | 0 | 22NOV94A | 30NOV94A |
| A3 84 | IWCP SES | 3 | 0 | 5DEC94A | 8DEC94A |
| A3 81 | IWCP Approval Removal GB007 | 0 | 0 | | 8DEC94A |
| A3 82 | Removal of GB007 | 70 | 16 | 13DEC94A | 28MAR95 |
| A3 809 | Erect Scaffolding | 1 | 0 | 13DEC94A | 13DEC94A |
| A3 807 | Remove Zone I HVAC Exhaust | 1 | 0 | 13DEC94A | 13DEC94A |
| A3 813 | Disassemble Scaffolding | 1 | 0 | 13DEC94A | 13DEC94A |
| A3 805 | Remove GB007 From Room 152 | 3 | 0 | 15DEC94A | 15DEC94A |




Activity Classification: ACTIVITY TYPE
HAMMOCK MILESTONE

| | |
|---|---|
| Target Date | 24JAN95 |
| Plot Date | 14MAR95 |
| Data Date | 7MAR95 |
| Project Start | 1AUG88 |
| Project Finish | 13FEB97 |



Activity Bar/Early Dates
Critical Activity
Progress Bar
Target Dates
Milestone/Flag Activity

MP01

Sheet 1 of 10

EG&G R.F.E.T.S., Inc
Bldg. 779 Rm. 152/154, Hydride Lab
Work Package #13012 Total Project

Plot date: 14MAR95 Statused through: 06MAR95

| Date | Revision | Checked | Approved |
|---|---|---|---|
| | | | |

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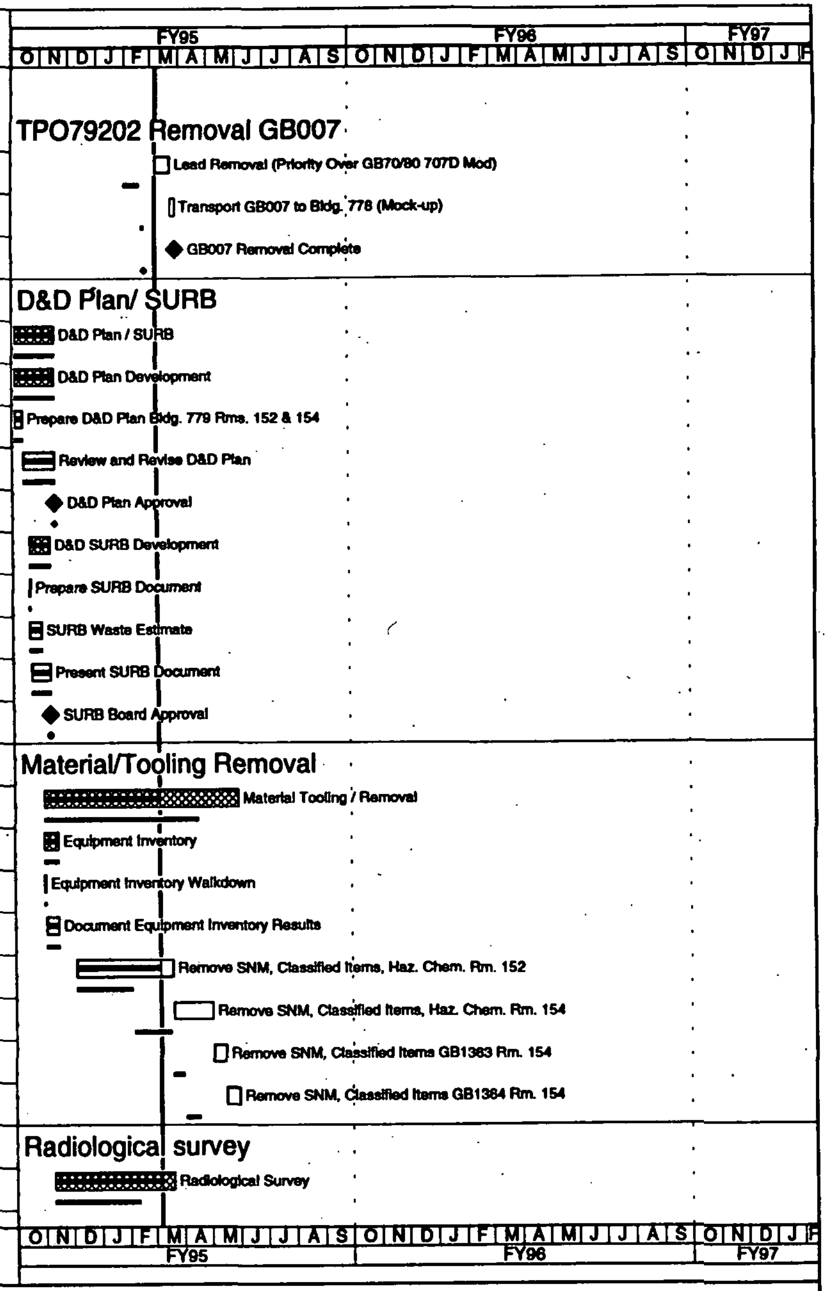
| ACTIVITY ID | ACTIVITY DESCRIPTION | ORIG DUR | REM DUR | EARLY START | EARLY FINISH |
|---|---|---|---|---|---|
| A3 801 | Lead Removal (Priority Over GB70/80 707D Mod) | 13 | 13 | 7MAR95 | 23MAR95 |
| A3 811 | Transport GB007 to Bldg. 778 (Mock-up) | 3 | 3 | 24MAR95 | 28MAR95 |
| A3 815 | GB007 Removal Complete | 0 | 0 | | 28MAR95 |
| A3 10 | D&D Plan / SURB | 32 | 0 | 3OCT94A | 15NOV94A |
| A3 99 | D&D Plan Development | 32 | 0 | 3OCT94A | 15NOV94A |
| A3 100 | Prepare D&D Plan Bldg. 779 Rms. 152 & 154 | 15 | 0 | 3OCT94A | 11OCT94A |
| A3 101 | Review and Revise D&D Plan | 18 | 0 | 12OCT94A | 15NOV94A |
| A3 103 | D&D Plan Approval | 0 | 0 | | 15NOV94A |
| A3 104 | D&D SURB Development | 17 | 0 | 18OCT94A | 9NOV94A |
| A3 105 | Prepare SURB Document | 2 | 0 | 18OCT94A | 19OCT94A |
| A3 106 | SURB Waste Estimate | 10 | 0 | 18OCT94A | 31OCT94A |
| A3 110 | Present SURB Document | 15 | 0 | 20OCT94A | 9NOV94A |
| A3 115 | SURB Board Approval | 0 | 0 | | 9NOV94A |
| A3 60 | Material Tooling / Removal | 142 | 60 | 1NOV94A | 31MAY95 |
| A3 359 | Equipment Inventory | 12 | 0 | 1NOV94A | 16NOV94A |
| A3 360 | Equipment Inventory Walkdown | 2 | 0 | 1NOV94A | 2NOV94A |
| A3 365 | Document Equipment Inventory Results | 5 | 0 | 3NOV94A | 16NOV94A |
| A3 415 | Remove SNM, Classified Items, Haz. Chem. Rm. 152 | 39 | 10 | 5DEC94A | 20MAR95 |
| A3 416 | Remove SNM, Classified Items, Haz. Chem. Rm. 154 | 30 | 30 | 21MAR95 | 2MAY95 |
| A3 417 | Remove SNM, Classified Items GB1383 Rm. 154 | 10 | 10 | 3MAY95 | 16MAY95 |
| A3 418 | Remove SNM, Classified Items GB1384 Rm. 154 | 10 | 10 | 17MAY95 | 31MAY95 |
| A3 90 | Radiological Survey | 85 | 10 | 10NOV94A | 20MAR95 |




Activity Classification: ACTIVITY TYPE
HAMMOCK
MILESTONE

Target Date 24JAN95
Plot Date 14MAR95
Data Date 7MAR95
Project Start 1AUG88
Project Finish 13FEB97
(c) Primavera Systems, Inc.

Activity Bar/Early Dates
Critical Activity
Progress Bar
Target Dates
Milestone/Flag Activity

MP01

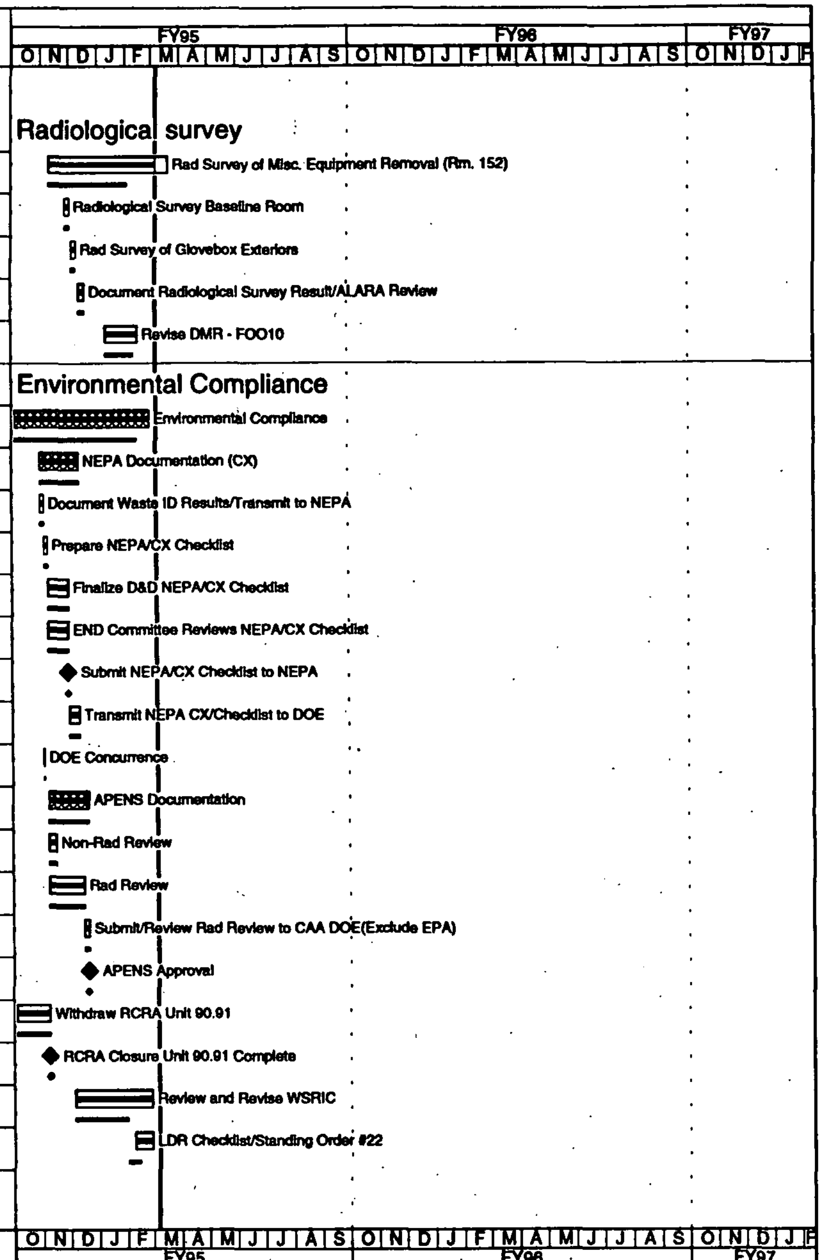
Sheet 2 of 10

**EG&G R.F.E.T.S., Inc**
**Bldg. 779 Rm. 152/154, Hydride Lab**
**Work Package #13012 Total Project**

Plot date: 14MAR95 Statused through: 06MAR95

| Date | Revision | Checked | Approved |
|---|---|---|---|
| | | | |

| ACTIVITY ID | ACTIVITY DESCRIPTION | ORIG DUR | REM DUR | EARLY START | EARLY FINISH |
|---|---|---|---|---|---|
| A3 305 | Rad Survey of Misc. Equipment Removal (Rm. 152) | 54 | 10 | 10NOV94A | 20MAR95 |
| A3 307 | Radiological Survey Baseline Room | 5 | 0 | 28NOV94A | 2DEC94A |
| A3 310 | Rad Survey of Glovebox Exteriors | 5 | 0 | 5DEC94A | 9DEC94A |
| A3 320 | Document Radiological Survey Result/ALARA Review | 5 | 0 | 13DEC94A | 19DEC94A |
| A3 321 | Revise DMR - FOO10 | 23 | 0 | 11JAN95A | 15FEB95A |
| A3 70 | Environmental Compliance | 98 | 0 | 3OCT94A | 27FEB95A |
| A3 380 | NEPA Documentation (CX) | 29 | 0 | 31OCT94A | 12DEC94A |
| A3 375 | Document Waste ID Results/Transmit to NEPA | 4 | 0 | 31OCT94A | 3NOV94A |
| A3 381 | Prepare NEPA/CX Checklist | 2 | 0 | 4NOV94A | 7NOV94A |
| A3 384 | Finalize D&D NEPA/CX Checklist | 15 | 0 | 8NOV94A | 30NOV94A |
| A3 386 | END Committee Reviews NEPA/CX Checklist | 15 | 0 | 8NOV94A | 30NOV94A |
| A3 385 | Submit NEPA/CX Checklist to NEPA | 0 | 0 | | 30NOV94A |
| A3 387 | Transmit NEPA CX/Checklist to DOE | 7 | 0 | 1DEC94A | 12DEC94A |
| A3 388 | DOE Concurrence | 10 | 0 | 3NOV94A | 3NOV94A |
| A3 390 | APENS Documentation | 30 | 0 | 8NOV94A | 21DEC94A |
| A3 391 | Non-Rad Review | 12 | 0 | 8NOV94A | 16NOV94A |
| A3 392 | Rad Review | 27 | 0 | 8NOV94A | 16DEC94A |
| A3 393 | Submit/Review Rad Review to CAA DOE(Exclude EPA) | 4 | 0 | 16DEC94A | 21DEC94A |
| A3 394 | APENS Approval | 0 | 0 | | 21DEC94A |
| A3 395 | Withdraw RCRA Unit 90.91 | 57 | 0 | 3OCT94A | 8NOV94A |
| A3 396 | RCRA Closure Unit 90.91 Complete | 0 | 0 | | 8NOV94A |
| A3 431 | Review and Revise WSRIC | 27 | 0 | 5DEC94A | 27FEB95A |
| A3 430 | LDR Checklist/Standing Order #22 | 9 | 0 | 8FEB95A | 27FEB95A |




Activity Classification: ACTIVITY TYPE
HAMMOCK
MILESTONE

| | |
|---|---|
| Target Date | 24JAN95 |
| Plot Date | 14MAR95 |
| Data Date | 7MAR95 |
| Project Start | 1AUG88 |
| Project Finish | 13FEB97 |



Activity Bar/Early Dates
Critical Activity
Progress Bar
Target Dates
Milestone/Flag Activity

MP01

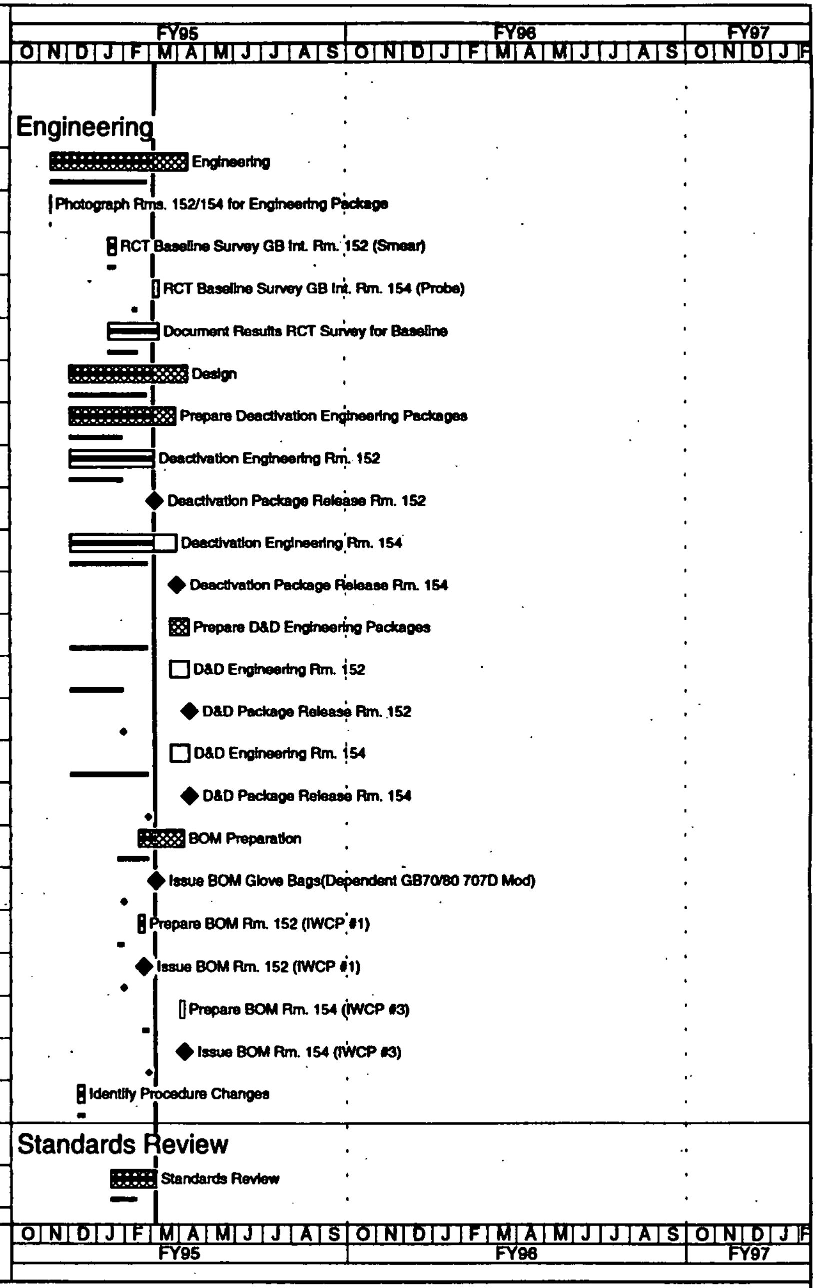
Sheet 3 of 10

EG&G R.F.E.T.S., Inc
Bldg. 779 Rm. 152/154, Hydride Lab
Work Package #13012 Total Project

Plot date: 14MAR95 Statused through: 06MAR95

| Date | Revision | Checked | Approved |
|---|---|---|---|
| | | | |

| ACTIVITY ID | ACTIVITY DESCRIPTION | ORIG DUR | REM DUR | EARLY START | EARLY FINISH |
|---|---|---|---|---|---|
| | **Engineering** | | | | |
| A3 30 | Engineering | 101 | 28 | 14NOV94A | 13APR95 |
| A3 420 | Photograph Rms. 152/154 for Engineering Package | 1 | 0 | 14NOV94A | 14NOV94A |
| A3 421 | RCT Baseline Survey GB Int. Rm. 152 (Smear) | 5 | 0 | 17JAN95A | 25JAN95A |
| A3 423 | RCT Baseline Survey GB Int. Rm. 154 (Probe) | 5 | 5 | 7MAR95 | 13MAR95 |
| A3 422 | Document Results RCT Survey for Baseline | 24 | 1 | 17JAN95A | 13MAR95 |
| A3 424 | Design | 88 | 28 | 5DEC94A | 13APR95 |
| A3 152425 | Prepare Deactivation Engineering Packages | 79 | 19 | 5DEC94A | 31MAR95 |
| A3 152820 | Deactivation Engineering Rm. 152 | 24 | 1 | 5DEC94A | 7MAR95 |
| A3 152821 | Deactivation Package Release Rm. 152 | 0 | 0 | | 7MAR95 |
| A3 154820 | Deactivation Engineering Rm. 154 | 55 | 19 | 5DEC94A | 31MAR95 |
| A3 154821 | Deactivation Package Release Rm. 154 | 0 | 0 | | 31MAR95 |
| A3 154425 | Prepare D&D Engineering Packages | 15 | 15 | 24MAR95 | 13APR95 |
| A3 152824 | D&D Engineering Rm. 152 | 15 | 15 | 24MAR95 | 13APR95 |
| A3 152435 | D&D Package Release Rm. 152 | 0 | 0 | | 13APR95 |
| A3 154824 | D&D Engineering Rm. 154 | 15 | 15 | 24MAR95 | 13APR95 |
| A3 154435 | D&D Package Release Rm. 154 | 0 | 0 | | 13APR95 |
| A3 452 | BOM Preparation | 36 | 24 | 17FEB95A | 7APR95 |
| A3 665 | Issue BOM Glove Bags(Dependent GB70/80 707D Mod) | 0 | 0 | 8MAR95 | |
| A3 651 | Prepare BOM Rm. 152 (IWCP #1) | 5 | 0 | 17FEB95A | 23FEB95A |
| A3 652 | Issue BOM Rm. 152 (IWCP #1) | 0 | 0 | | 23FEB95A |
| A3 658 | Prepare BOM Rm. 154 (IWCP #3) | 5 | 5 | 3APR95 | 7APR95 |
| A3 659 | Issue BOM Rm. 154 (IWCP #3) | 0 | 0 | | 7APR95 |
| A3 455 | Identify Procedure Changes | 5 | 0 | 12DEC94A | 19DEC94A |
| | **Standards Review** | | | | |
| A3 20 | Standards Review | 36 | 1 | 17JAN95A | 7MAR95 |




Activity Classification: ACTIVITY TYPE
HAMMOCK
MILESTONE

Activity Bar/Early Dates
Critical Activity
Progress Bar
Target Dates
Milestone/Flag Activity

| | |
|---|---|
| Target Date | 24JAN95 |
| Plot Date | 14MAR95 |
| Data Date | 7MAR95 |
| Project Start | 1AUG88 |
| Project Finish | 13FEB97 |



MP01

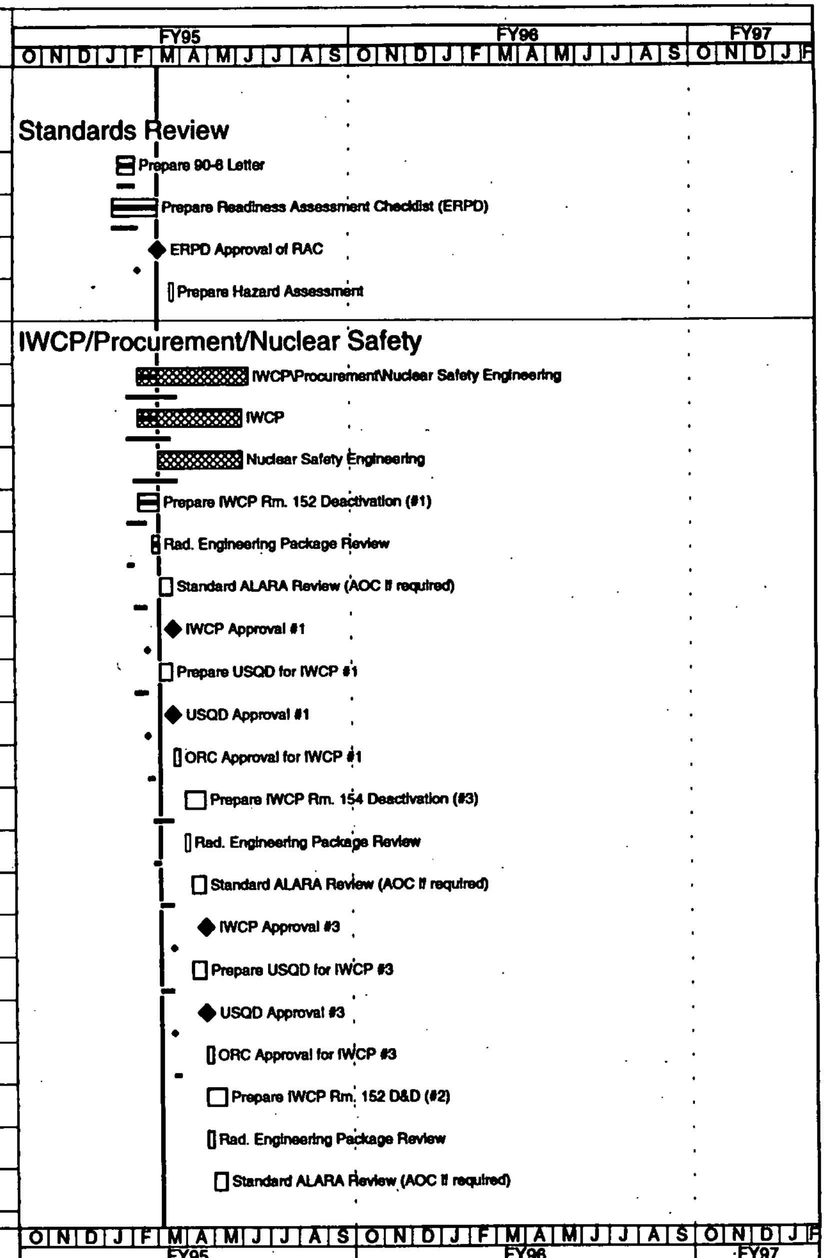
Sheet 4 of 10

**EG&G R.F.E.T.S., Inc**
**Bldg. 779 Rm. 152/154, Hydride Lab**
**Work Package #13012 Total Project**

Plot date: 14MAR95 Statused through: 06MAR95

| Date | Revision | Checked | Approved |
|---|---|---|---|
| | | | |

| ACTIVITY ID | ACTIVITY DESCRIPTION | ORIG DUR | REM DUR | EARLY START | EARLY FINISH |
|---|---|---|---|---|---|
| A3 120 | Prepare 90-6 Letter | 15 | 0 | 23JAN95A | 10FEB95A |
| A3 432 | Prepare Readiness Assessment Checklist (ERPD) | 20 | 1 | 17JAN95A | 7MAR95 |
| A3 433 | ERPD Approval of RAC | 0 | 0 | | 7MAR95 |
| A3 434 | Prepare Hazard Assessment | 4 | 4 | 21MAR95 | 24MAR95 |
| A3 39 | IWCP\Procurement\Nuclear Safety Engineering | 85 | 69 | 13FEB95A | 13JUN95 |
| A3 40 | IWCP | 80 | 64 | 13FEB95A | 6JUN95 |
| A3 439 | Nuclear Safety Engineering | 64 | 64 | 7MAR95 | 6JUN95 |
| A3 650 | Prepare IWCP Rm. 152 Deactivation (#1) | 15 | 1 | 13FEB95A | 7MAR95 |
| A3 661 | Rad. Engineering Package Review | 5 | 1 | 28FEB95A | 7MAR95 |
| A3 662 | Standard ALARA Review (AOC if required) | 10 | 10 | 8MAR95 | 21MAR95 |
| A3 656 | IWCP Approval #1 | 0 | 0 | | 21MAR95 |
| A3 440 | Prepare USQD for IWCP #1 | 10 | 10 | 7MAR95 | 20MAR95 |
| A3 450 | USQD Approval #1 | 0 | 0 | | 20MAR95 |
| A3 445 | ORC Approval for IWCP #1 | 5 | 5 | 22MAR95 | 28MAR95 |
| A3 657 | Prepare IWCP Rm. 154 Deactivation (#3) | 15 | 15 | 3APR95 | 24APR95 |
| A3 694 | Rad. Engineering Package Review | 5 | 5 | 3APR95 | 7APR95 |
| A3 663 | Standard ALARA Review (AOC if required) | 10 | 10 | 10APR95 | 24APR95 |
| A3 664 | IWCP Approval #3 | 0 | 0 | | 24APR95 |
| A3 456 | Prepare USQD for IWCP #3 | 10 | 10 | 10APR95 | 24APR95 |
| A3 457 | USQD Approval #3 | 0 | 0 | | 24APR95 |
| A3 458 | ORC Approval for IWCP #3 | 5 | 5 | 25APR95 | 1MAY95 |
| A3 700 | Prepare IWCP Rm. 152 D&D (#2) | 15 | 15 | 25APR95 | 15MAY95 |
| A3 701 | Rad. Engineering Package Review | 5 | 5 | 25APR95 | 1MAY95 |
| A3 702 | Standard ALARA Review (AOC if required) | 10 | 10 | 2MAY95 | 15MAY95 |




Activity Classification: ACTIVITY TYPE
HAMMOCK
MILESTONE

Target Date 24JAN95
Plot Date 14MAR95
Data Date 7MAR95
Project Start 1AUG88
Project Finish 13FEB97



Activity Bar/Early Dates
Critical Activity
Progress Bar
Target Dates
Milestone/Flag Activity

MP01

Sheet 5 of 10

**EG&G R.F.E.T.S., Inc**
**Bldg. 779 Rm. 152/154, Hydride Lab**
**Work Package #13012 Total Project**

Plot date: 14MAR95 Statused through: 06MAR95

| Date | Revision | Checked | Approved |
|---|---|---|---|
| | | | |

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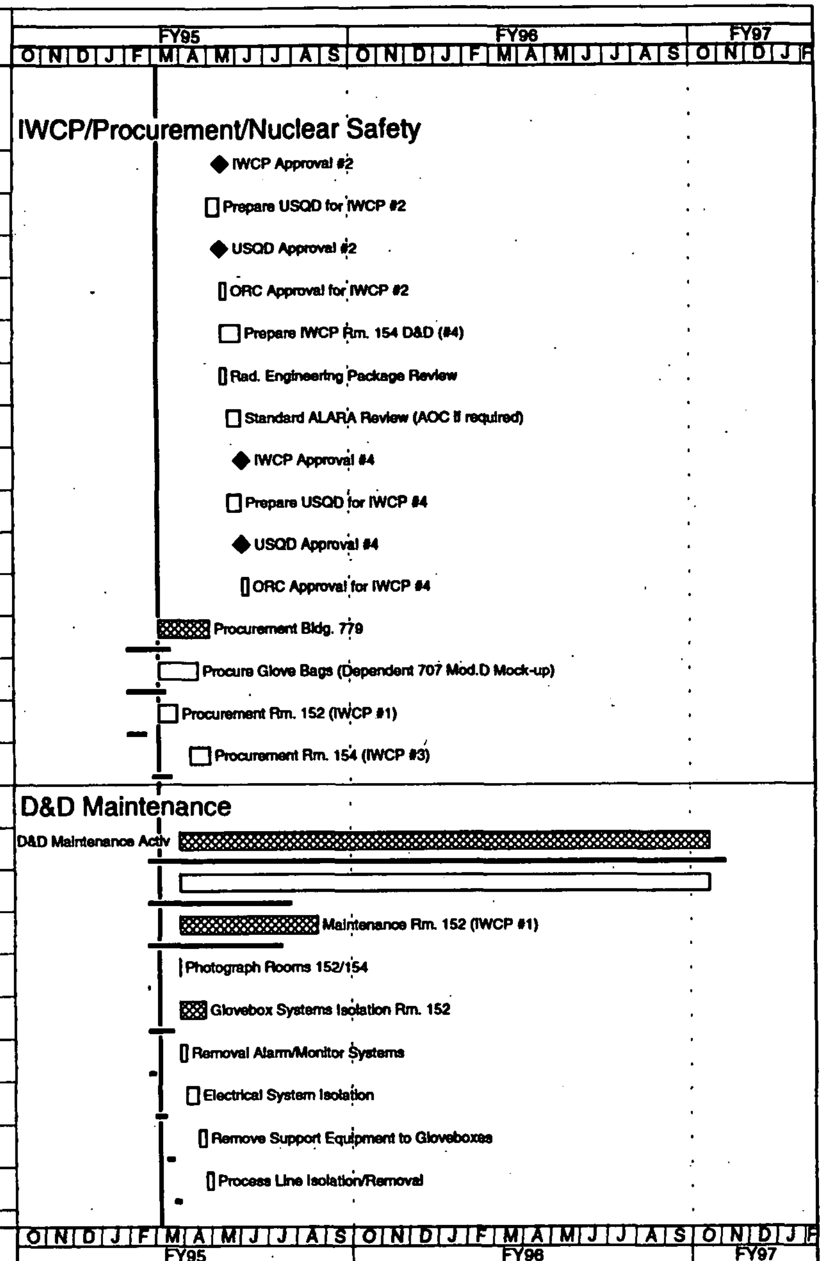
| ACTIVITY ID | ACTIVITY DESCRIPTION | ORIG DUR | REM DUR | EARLY START | EARLY FINISH |
|---|---|---|---|---|---|
| | | | | | |
| A3 703 | IWCP Approval #2 | 0 | 0 | | 15MAY95 |
| A3 704 | Prepare USQD for IWCP #2 | 10 | 10 | 2MAY95 | 15MAY95 |
| A3 705 | USQD Approval #2 | 0 | 0 | | 15MAY95 |
| A3 706 | ORC Approval for IWCP #2 | 5 | 5 | 16MAY95 | 22MAY95 |
| A3 710 | Prepare IWCP Rm. 154 D&D (#4) | 15 | 15 | 16MAY95 | 6JUN95 |
| A3 711 | Rad. Engineering Package Review | 5 | 5 | 16MAY95 | 22MAY95 |
| A3 712 | Standard ALARA Review (AOC if required) | 10 | 10 | 23MAY95 | 6JUN95 |
| A3 713 | IWCP Approval #4 | 0 | 0 | | 6JUN95 |
| A3 714 | Prepare USQD for IWCP #4 | 10 | 10 | 23MAY95 | 6JUN95 |
| A3 715 | USQD Approval #4 | 0 | 0 | | 6JUN95 |
| A3 716 | ORC Approval for IWCP #4 | 5 | 5 | 7JUN95 | 13JUN95 |
| A3 451 | Procurement Bldg. 779 | 39 | 39 | 7MAR95 | 1MAY95 |
| A3 667 | Procure Glove Bags (Dependent 707 Mod.D Mock-up) | 30 | 30 | 8MAR95 | 19APR95 |
| A3 653 | Procurement Rm. 152 (IWCP #1) | 15 | 15 | 7MAR95 | 27MAR95 |
| A3 660 | Procurement Rm. 154 (IWCP #3) | 15 | 15 | 10APR95 | 1MAY95 |
| | | | | | |
| A3 50 | D&D Maintenance Activities | 393 | 393 | 29MAR95 | 21OCT96 |
| A3 152578 | D&D Maintenance Engineering Support and Supplies | 393 | 393 | 29MAR95 | 21OCT96 |
| A3 152579 | Maintenance Rm. 152 (IWCP #1) | 105 | 105 | 29MAR95 | 25AUG95 |
| A3 579 | Photograph Rooms 152/154 | 1 | 1 | 29MAR95 | 29MAR95 |
| A3 152580 | Glovebox Systems Isolation Rm. 152 | 19 | 19 | 29MAR95 | 25APR95 |
| A3 152581 | Removal Alarm/Monitor Systems | 5 | 5 | 29MAR95 | 4APR95 |
| A3 152584 | Electrical System Isolation | 8 | 8 | 5APR95 | 17APR95 |
| A3 152586 | Remove Support Equipment to Gloveboxes | 6 | 6 | 18APR95 | 25APR95 |
| A3 152585 | Process Line Isolation/Removal | 5 | 5 | 26APR95 | 2MAY95 |




Activity Classification: ACTIVITY TYPE
HAMMOCK
MILESTONE

Target Date 24JAN95
Plot Date 14MAR95
Data Date 7MAR95
Project Start 1AUG88
Project Finish 13FEB97

Activity Bar/Early Dates
Critical Activity
Progress Bar
Target Dates
Milestone/Flag Activity

MP01

Sheet 6 of 10

**EG&G R.F.E.T.S., Inc**
**Bldg. 779 Rm. 152/154, Hydride Lab**
**Work Package #13012 Total Project**

Plot date: 14MAR95 Statused through: 06MAR95

| Date | Revision | Checked | Approved |
|---|---|---|---|
| | | | |



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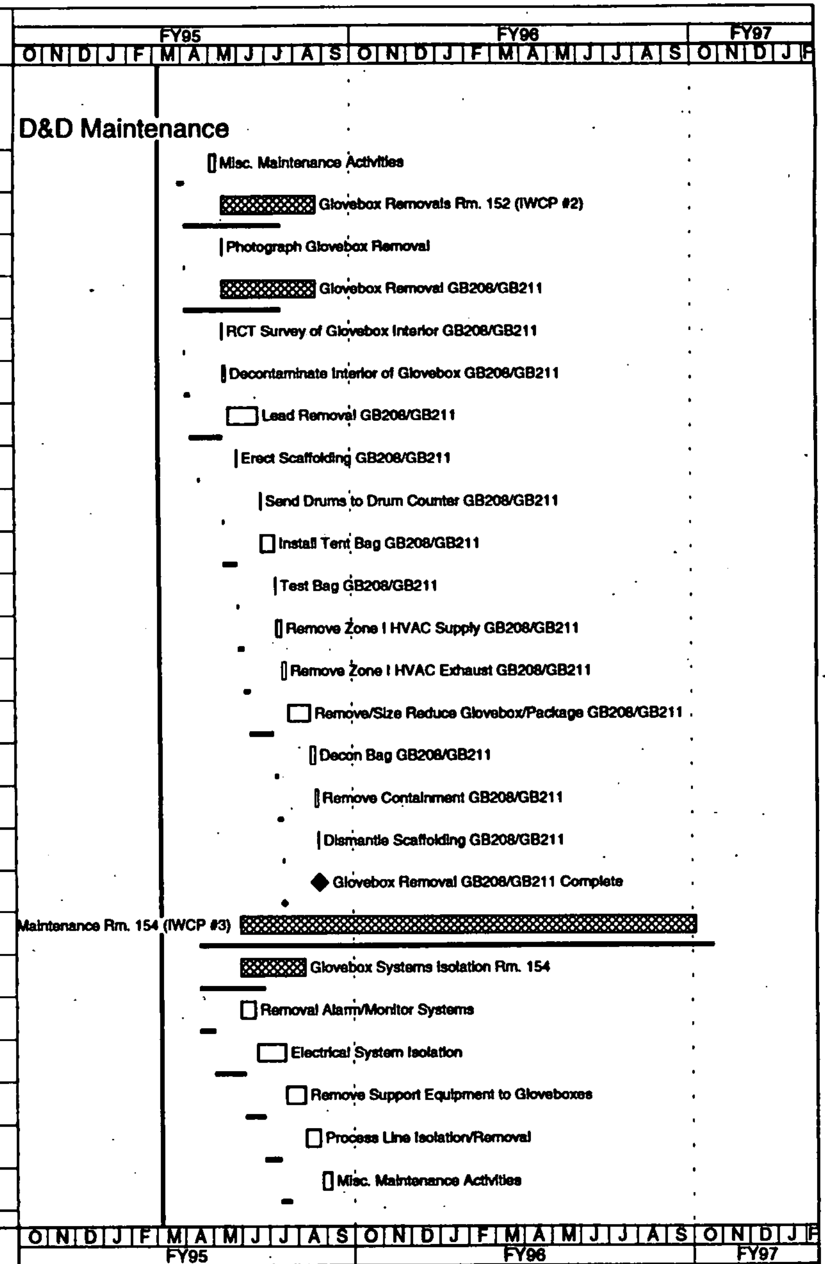
| ACTIVITY ID | ACTIVITY DESCRIPTION | ORIG DUR | REM DUR | EARLY START | EARLY FINISH |
|---|---|---|---|---|---|
| A3 152590 | Misc. Maintenance Activities | 5 | 5 | 3MAY95 | 9MAY95 |
| A3 152595 | Glovebox Removals Rm. 152 (IWCP #2) | 72 | 72 | 16MAY95 | 25AUG95 |
| A3 152699 | Photograph Glovebox Removal | 1 | 1 | 16MAY95 | 16MAY95 |
| A3 152862 | Glovebox Removal GB208/GB211 | 72 | 72 | 16MAY95 | 25AUG95 |
| A3 152832 | RCT Survey of Glovebox Interior GB208/GB211 | 1 | 1 | 16MAY95 | 16MAY95 |
| A3 152833 | Decontaminate Interior of Glovebox GB208/GB211 | 3 | 3 | 17MAY95 | 19MAY95 |
| A3 152834 | Lead Removal GB208/GB211 | 24 | 24 | 22MAY95 | 23JUN95 |
| A3 152836 | Erect Scaffolding GB208/GB211 | 1 | 1 | 31MAY95 | 31MAY95 |
| A3 152835 | Send Drums to Drum Counter GB208/GB211 | 1 | 1 | 26JUN95 | 26JUN95 |
| A3 152837 | Install Tent Bag GB208/GB211 | 10 | 10 | 26JUN95 | 10JUL95 |
| A3 152838 | Test Bag GB208/GB211 | 1 | 1 | 11JUL95 | 11JUL95 |
| A3 152839 | Remove Zone I HVAC Supply GB208/GB211 | 4 | 4 | 12JUL95 | 17JUL95 |
| A3 152840 | Remove Zone I HVAC Exhaust GB208/GB211 | 4 | 4 | 18JUL95 | 21JUL95 |
| A3 152841 | Remove/Size Reduce Glovebox/Package GB208/GB211 | 18 | 18 | 24JUL95 | 18AUG95 |
| A3 152842 | Decon Bag GB208/GB211 | 3 | 3 | 17AUG95 | 21AUG95 |
| A3 152843 | Remove Containment GB208/GB211 | 3 | 3 | 22AUG95 | 24AUG95 |
| A3 152844 | Dismantle Scaffolding GB208/GB211 | 1 | 1 | 25AUG95 | 25AUG95 |
| A3 152845 | Glovebox Removal GB208/GB211 Complete | 0 | 0 | | 25AUG95 |
| A3 154579 | Maintenance Rm. 154 (IWCP #3) | 338 | 338 | 1JUN95 | 4OCT96 |
| A3 154580 | Glovebox Systems Isolation Rm. 154 | 49 | 49 | 1JUN95 | 9AUG95 |
| A3 154581 | Removal Alarm/Monitor Systems | 12 | 12 | 1JUN95 | 16JUN95 |
| A3 154584 | Electrical System Isolation | 22 | 22 | 19JUN95 | 19JUL95 |
| A3 154586 | Remove Support Equipment to Gloveboxes | 15 | 15 | 20JUL95 | 9AUG95 |
| A3 154585 | Process Line Isolation/Removal | 12 | 12 | 10AUG95 | 25AUG95 |
| A3 154590 | Misc. Maintenance Activities | 7 | 7 | 28AUG95 | 6SEP95 |




Activity Classification: ACTIVITY TYPE
HAMMOCK
MILESTONE

| | |
|---|---|
| Target Date | 24JAN95 |
| Plot Date | 14MAR95 |
| Data Date | 7MAR95 |
| Project Start | 1AUG88 |
| Project Finish | 13FEB97 |



Activity Bar/Early Dates
Critical Activity
Progress Bar
Target Dates
Milestone/Flag Activity

MP01

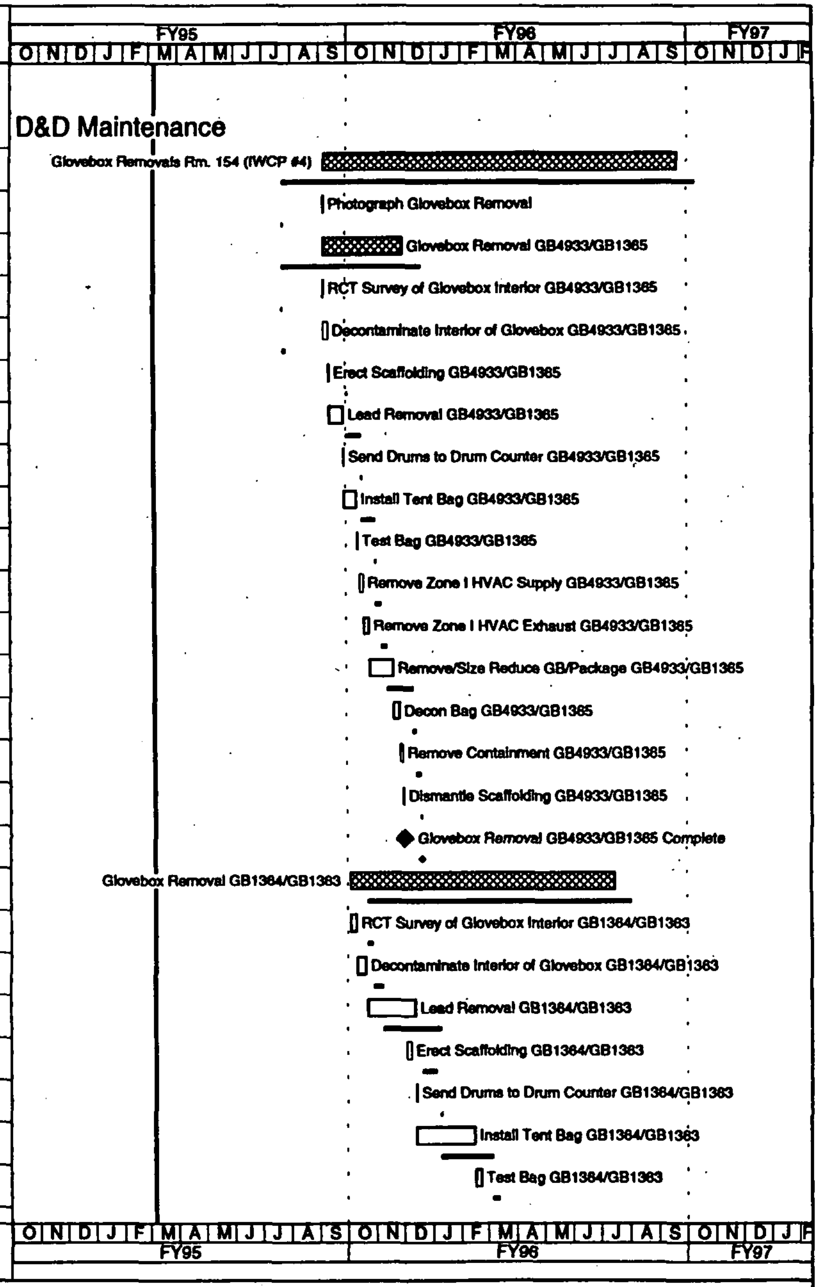
Sheet 7 of 10

**EG&G R.F.E.T.S., Inc**
**Bldg. 779 Rm. 152/154, Hydride Lab**
**Work Package #13012 Total Project**

Plot date: 14MAR95 Statused through: 06MAR95

| Date | Revision | Checked | Approved |
|---|---|---|---|
| | | | |

| ACTIVITY ID | ACTIVITY DESCRIPTION | ORIG DUR | REM DUR | EARLY START | EARLY FINISH |
|---|---|---|---|---|---|
| A3 154595 | Glovebox Removals Rm. 154 (IWCP #4) | 260 | 260 | 7SEP95 | 20SEP96 |
| A3 154699 | Photograph Glovebox Removal | 1 | 1 | 7SEP95 | 7SEP95 |
| A3 154846 | Glovebox Removal GB4933/GB1365 | 60 | 60 | 7SEP95 | 1DEC95 |
| A3 154847 | RCT Survey of Glovebox Interior GB4933/GB1365 | 1 | 1 | 7SEP95 | 7SEP95 |
| A3 154848 | Decontaminate Interior of Glovebox GB4933/GB1365 | 3 | 3 | 8SEP95 | 12SEP95 |
| A3 154851 | Erect Scaffolding GB4933/GB1365 | 1 | 1 | 13SEP95 | 13SEP95 |
| A3 154849 | Lead Removal GB4933/GB1365 | 12 | 12 | 13SEP95 | 28SEP95 |
| A3 154850 | Send Drums to Drum Counter GB4933/GB1365 | 1 | 1 | 29SEP95 | 29SEP95 |
| A3 154852 | Install Tent Bag GB4933/GB1365 | 10 | 10 | 29SEP95 | 12OCT95 |
| A3 154853 | Test Bag GB4933/GB1365 | 1 | 1 | 13OCT95 | 13OCT95 |
| A3 154854 | Remove Zone I HVAC Supply GB4933/GB1365 | 4 | 4 | 16OCT95 | 19OCT95 |
| A3 154855 | Remove Zone I HVAC Exhaust GB4933/GB1365 | 4 | 4 | 20OCT95 | 25OCT95 |
| A3 154856 | Remove/Size Reduce GB/Package GB4933/GB1365 | 18 | 18 | 26OCT95 | 20NOV95 |
| A3 154857 | Decon Bag GB4933/GB1365 | 3 | 3 | 21NOV95 | 27NOV95 |
| A3 154858 | Remove Containment GB4933/GB1365 | 3 | 3 | 28NOV95 | 30NOV95 |
| A3 154859 | Dismantle Scaffolding GB4933/GB1365 | 1 | 1 | 1DEC95 | 1DEC95 |
| A3 154860 | Glovebox Removal GB4933/GB1365 Complete | 0 | 0 | | 1DEC95 |
| A3 154861 | Glovebox Removal GB1364/GB1363 | 193 | 193 | 4OCT95 | 15JUL96 |
| A3 154862 | RCT Survey of Glovebox Interior GB1364/GB1363 | 5 | 5 | 4OCT95 | 10OCT95 |
| A3 154863 | Decontaminate Interior of Glovebox GB1364/GB1363 | 8 | 8 | 11OCT95 | 20OCT95 |
| A3 154864 | Lead Removal GB1364/GB1363 | 38 | 38 | 23OCT95 | 13DEC95 |
| A3 154866 | Erect Scaffolding GB1364/GB1363 | 5 | 5 | 4DEC95 | 8DEC95 |
| A3 154865 | Send Drums to Drum Counter GB1364/GB1363 | 1 | 1 | 14DEC95 | 14DEC95 |
| A3 154867 | Install Tent Bag GB1364/GB1363 | 40 | 40 | 14DEC95 | 15FEB96 |
| A3 154868 | Test Bag GB1364/GB1363 | 5 | 5 | 16FEB96 | 22FEB96 |




Activity Classification: ACTIVITY TYPE
HAMMOCK
MILESTONE

Target Date 24JAN95
Plot Date 14MAR95
Data Date 7MAR95
Project Start 1AUG88
Project Finish 13FEB97
(c) Primavera Systems, Inc.

Activity Bar/Early Dates
Critical Activity
Progress Bar
Target Dates
Milestone/Flag Activity

MP01

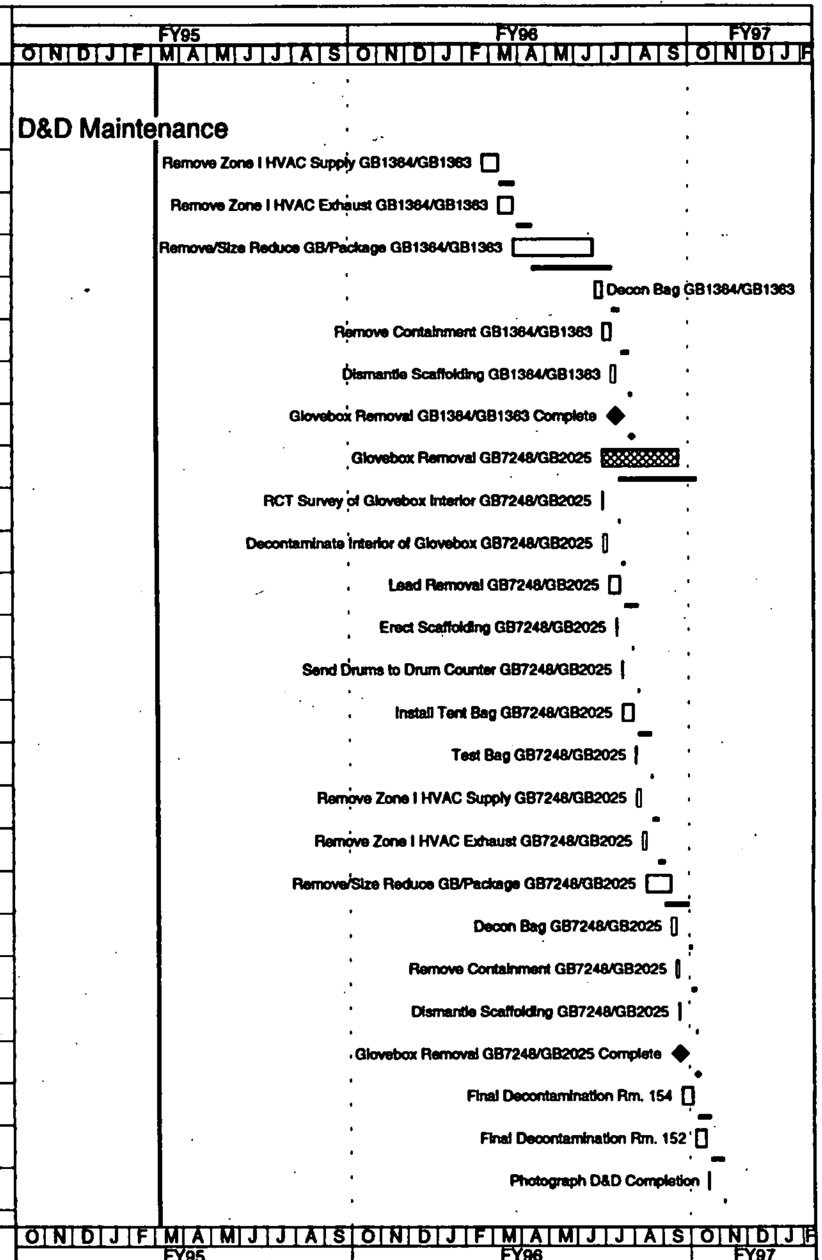
Sheet 8 of 10

**EG&G R.F.E.T.S., Inc**
**Bldg. 779 Rm. 152/154, Hydride Lab**
**Work Package #13012 Total Project**

Plot date: 14MAR95 Statused through: 06MAR95

| Date | Revision | Checked | Approved |
|---|---|---|---|
| | | | |

| ACTIVITY ID | ACTIVITY DESCRIPTION | ORIG DUR | REM DUR | EARLY START | EARLY FINISH |
|---|---|---|---|---|---|
| A3 154869 | Remove Zone I HVAC Supply GB1364/GB1363 | 12 | 12 | 23FEB96 | 11MAR96 |
| A3 154870 | Remove Zone I HVAC Exhaust GB1364/GB1363 | 12 | 12 | 12MAR96 | 27MAR96 |
| A3 154871 | Remove/Size Reduce GB/Package GB1364/GB1363 | 60 | 60 | 28MAR96 | 21JUN96 |
| A3 154872 | Decon Bag GB1364/GB1363 | 6 | 6 | 24JUN96 | 1JUL96 |
| A3 154873 | Remove Containment GB1364/GB1363 | 6 | 6 | 2JUL96 | 10JUL96 |
| A3 154874 | Dismantle Scaffolding GB1364/GB1363 | 3 | 3 | 11JUL96 | 15JUL96 |
| A3 154875 | Glovebox Removal GB1364/GB1363 Complete | 0 | 0 | | 15JUL96 |
| A3 154876 | Glovebox Removal GB7248/GB2025 | 58 | 58 | 1JUL96 | 20SEP96 |
| A3 154877 | RCT Survey of Glovebox Interior GB7248/GB2025 | 1 | 1 | 1JUL96 | 1JUL96 |
| A3 154878 | Decontaminate Interior of Glovebox GB7248/GB2025 | 3 | 3 | 2JUL96 | 5JUL96 |
| A3 154879 | Lead Removal GB7248/GB2025 | 10 | 10 | 8JUL96 | 19JUL96 |
| A3 154881 | Erect Scaffolding GB7248/GB2025 | 1 | 1 | 16JUL96 | 16JUL96 |
| A3 154880 | Send Drums to Drum Counter GB7248/GB2025 | 1 | 1 | 22JUL96 | 22JUL96 |
| A3 154882 | Install Tent Bag GB7248/GB2025 | 10 | 10 | 22JUL96 | 2AUG96 |
| A3 154883 | Test Bag GB7248/GB2025 | 1 | 1 | 5AUG96 | 5AUG96 |
| A3 154884 | Remove Zone I HVAC Supply GB7248/GB2025 | 4 | 4 | 6AUG96 | 9AUG96 |
| A3 154885 | Remove Zone I HVAC Exhaust GB7248/GB2025 | 4 | 4 | 12AUG96 | 15AUG96 |
| A3 154886 | Remove/Size Reduce GB/Package GB7248/GB2025 | 18 | 18 | 16AUG96 | 11SEP96 |
| A3 154887 | Decon Bag GB7248/GB2025 | 3 | 3 | 12SEP96 | 16SEP96 |
| A3 154888 | Remove Containment GB7248/GB2025 | 3 | 3 | 17SEP96 | 19SEP96 |
| A3 154889 | Dismantle Scaffolding GB7248/GB2025 | 1 | 1 | 20SEP96 | 20SEP96 |
| A3 154890 | Glovebox Removal GB7248/GB2025 Complete | 0 | 0 | | 20SEP96 |
| A3 154600 | Final Decontamination Rm. 154 | 10 | 10 | 23SEP96 | 4OCT96 |
| A3 152600 | Final Decontamination Rm. 152 | 10 | 10 | 7OCT96 | 18OCT96 |
| A3 601 | Photograph D&D Completion | 1 | 1 | 21OCT96 | 21OCT96 |




Activity Classification: ACTIVITY TYPE
HAMMOCK
MILESTONE

| | |
|---|---|
| Target Date | 24JAN95 |
| Plot Date | 14MAR95 |
| Data Date | 7MAR95 |
| Project Start | 1AUG88 |
| Project Finish | 13FEB97 |



Activity Bar/Early Dates
Critical Activity
Progress Bar
Target Dates
Milestone/Flag Activity

MP01

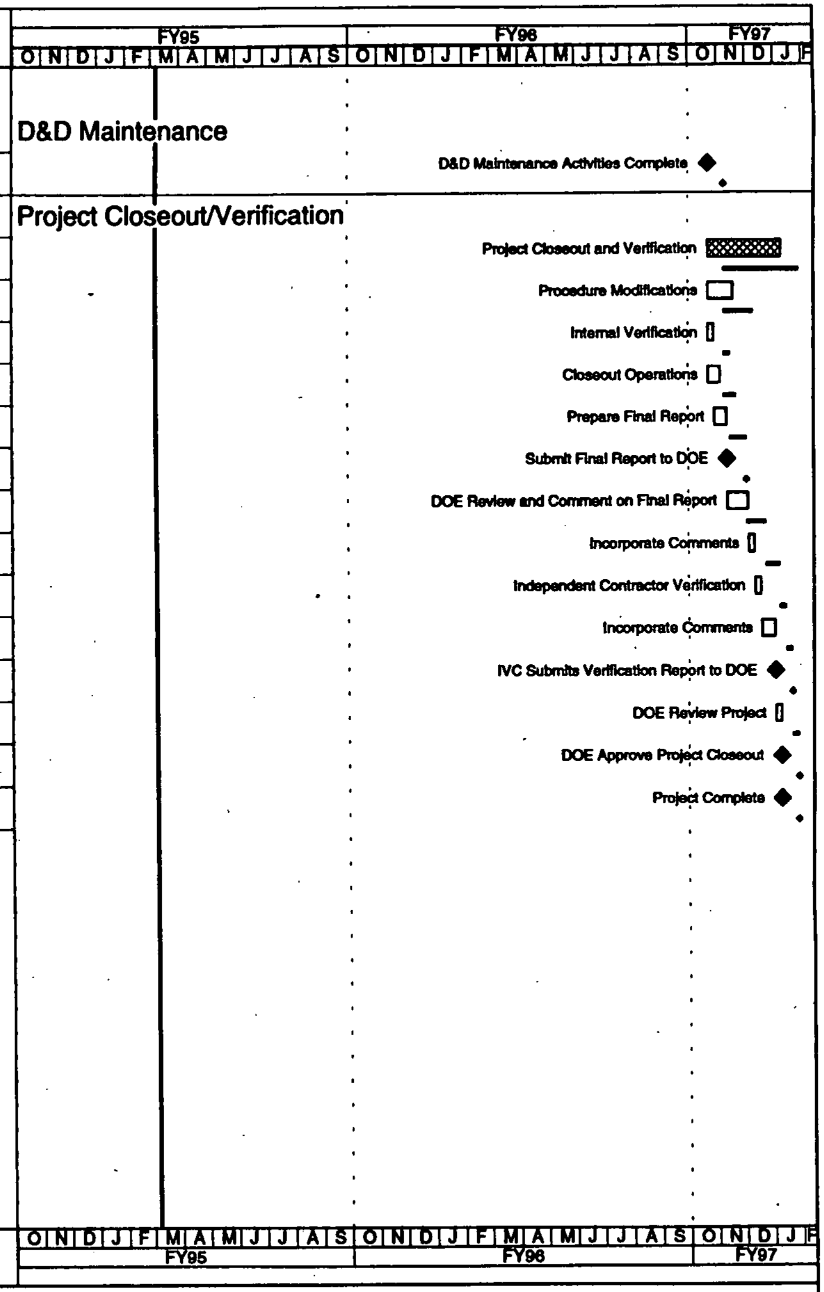
Sheet 9 of 10

**EG&G R.F.E.T.S., Inc**
**Bldg. 779 Rm. 152/154, Hydride Lab**
**Work Package #13012 Total Project**

Plot date: 14MAR95 Statused through: 06MAR95

| Date | Revision | Checked | Approved |
|---|---|---|---|
| | | | |

| ACTIVITY ID | ACTIVITY DESCRIPTION | ORIG DUR | REM DUR | EARLY START | EARLY FINISH |
|---|---|---|---|---|---|
| | **D&D Maintenance** | | | | |
| A3 602 | D&D Maintenance Activities Complete | 0 | 0 | | 21OCT96 |
| | **Project Closeout/Verification** | | | | |
| A3 900 | Project Closeout and Verification | 50 | 50 | 22OCT96 | 9JAN97 |
| A3 10000 | Procedure Modifications | 20 | 20 | 22OCT96 | 18NOV96 |
| A3 70182 | Internal Verification | 5 | 5 | 22OCT96 | 28OCT96 |
| A3 70181 | Closeout Operations | 10 | 10 | 22OCT96 | 4NOV96 |
| A3 70183 | Prepare Final Report | 10 | 10 | 29OCT96 | 11NOV96 |
| A3 70184 | Submit Final Report to DOE | 0 | 0 | | 11NOV96 |
| A3 70185 | DOE Review and Comment on Final Report | 15 | 15 | 12NOV96 | 4DEC96 |
| A3 70186 | Incorporate Comments | 5 | 5 | 5DEC96 | 11DEC96 |
| A3 70187 | Independent Contractor Verification | 5 | 5 | 12DEC96 | 18DEC96 |
| A3 70188 | Incorporate Comments | 5 | 5 | 19DEC96 | 2JAN97 |
| A3 70189 | IVC Submits Verification Report to DOE | 0 | 0 | | 2JAN97 |
| A3 70190 | DOE Review Project | 5 | 5 | 3JAN97 | 9JAN97 |
| A3 70191 | DOE Approve Project Closeout | 0 | 0 | | 9JAN97 |
| A3 70192 | Project Complete | 0 | 0 | | 9JAN97 |




Activity Classification: ACTIVITY TYPE

HAMMOCK

MILESTONE

Target Date 24JAN95
Plot Date 14MAR95
Data Date 7MAR95
Project Start 1AUG88
Project Finish 13FEB97



Activity Bar/Early Dates
Critical Activity
Progress Bar
Target Dates
Milestone/Flag Activity

MP01

Sheet 10 of 10

**EG&G R.F.E.T.S., Inc**
**Bldg. 779 Rm. 152/154, Hydride Lab**
**Work Package #13012 Total Project**

Plot date: 14MAR95 Statused through: 06MAR95

| Date | Revision | Checked | Approved |
|---|---|---|---|
| | | | |

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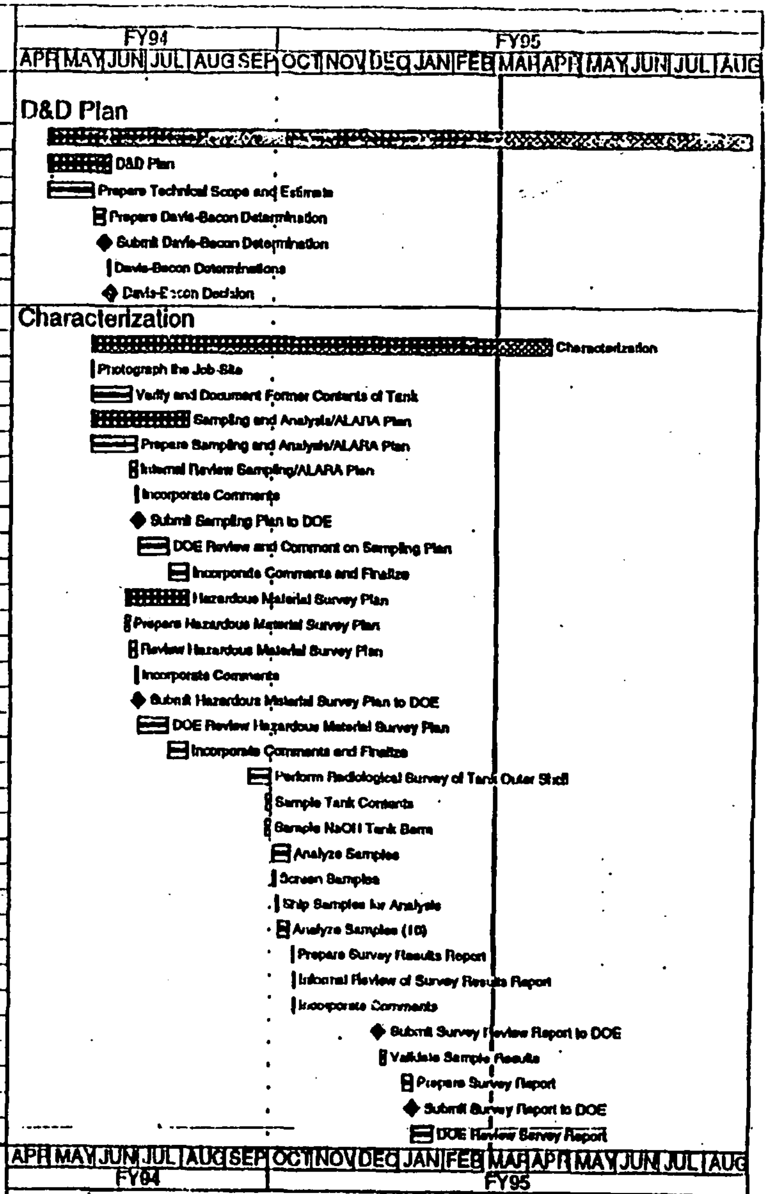
MAR 7 '95 10:06 FROM S M STOLLER CORP PAGE.002

| ACTIVITY ID | ACTIVITY DESCRIPTION | ORIG DUR | REM DUR | EARLY START | EARLY FINISH |
|---|---|---|---|---|---|
| D1 40002 | Pilot Project #4 - Storage Tanks 177 & 178 in PA | 533 | 122 | 25APR94A | 25AUG95 |
| D1 40001 | D&D Plan | 31 | 0 | 25APR94A | 7JUN94A |
| D1 40004 | Prepare Technical Scope and Estimate | 24 | 0 | 25APR94A | 26MAY94A |
| D1 40005 | Prepare Davis-Bacon Determination | 5 | 0 | 27MAY94A | 3JUN94A |
| D1 40006 | Submit Davis-Bacon Determination | 0 | 0 | | 3JUN94A |
| D1 40007 | Davis-Bacon Determinations | 15 | 0 | 6JUN94A | 7JUN94A |
| D1 40008 | Davis-Bacon Decision | 0 | 0 | | 7JUN94A |
| D1 40046 | Characterization | 218 | 28 | 27MAY94A | 12APR95 |
| D1 40047 | Photograph the Job-Site | 1 | 0 | 27MAY94A | 27MAY94A |
| D1 40048 | Verify and Document Former Contents of Tank | 5 | 0 | 27MAY94A | 23JUN94A |
| D1 40030 | Sampling and Analysis/ALARA Plan | 47 | 0 | 27MAY94A | 3AUG94A |
| D1 40031 | Prepare Sampling and Analysis/ALARA Plan | 10 | 0 | 27MAY94A | 27JUN94A |
| D1 40032 | Internal Review Sampling/ALARA Plan | 10 | 0 | 23JUN94A | 27JUN94A |
| D1 40033 | Incorporate Comments | 5 | 0 | 27JUN94A | 28JUN94A |
| D1 40034 | Submit Sampling Plan to DOE | 0 | 0 | | 28JUN94A |
| D1 40035 | DOE Review and Comment on Sampling Plan | 15 | 0 | 29JUN94A | 20JUL94A |
| D1 40036 | Incorporate Comments and Finalize | 6 | 0 | 21JUL94A | 3AUG94A |
| D1 40038 | Hazardous Material Survey Plan | 32 | 0 | 20JUN94A | 3AUG94A |
| D1 40039 | Prepare Hazardous Material Survey Plan | 3 | 0 | 20JUN94A | 22JUN94A |
| D1 40040 | Review Hazardous Material Survey Plan | 5 | 0 | 23JUN94A | 27JUN94A |
| D1 40041 | Incorporate Comments | 4 | 0 | 27JUN94A | 28JUN94A |
| D1 40042 | Submit Hazardous Material Survey Plan to DOE | 0 | 0 | | 28JUN94A |
| D1 40043 | DOE Review Hazardous Material Survey Plan | 7 | 0 | 29JUN94A | 20JUL94A |
| D1 40044 | Incorporate Comments and Finalize | 7 | 0 | 21JUL94A | 3AUG94A |
| D1 40061 | Perform Radiological Survey of Tank Outer Shell | 11 | 0 | 16SEP94A | 30SEP94A |
| D1 40049 | Sample Tank Contents | 3 | 0 | [illegible]SEP94A | 30SEP94A |
| D1 40050 | Sample NaOH Tank Berm | 3 | 0 | 28SEP94A | 30SEP94A |
| D1 40052 | Analyze Samples | 16 | 0 | 3OCT94A | 14OCT94A |
| D1 40053 | Screen Samples | 2 | 0 | 3OCT94A | 4OCT94A |
| D1 40054 | Ship Samples for Analysis | 2 | 0 | 5OCT94A | 6OCT94A |
| D1 40055 | Analyze Samples (10) | 21 | 0 | 7OCT94A | 14OCT94A |
| D1 40056 | Prepare Survey Results Report | 1 | 0 | 17OCT94A | 17OCT94A |
| D1 40057 | Informal Review of Survey Results Report | 5 | 0 | 18OCT94A | 18OCT94A |
| D1 40058 | Incorporate Comments | 4 | 0 | 18OCT94A | 18OCT94A |
| D1 40059 | Submit Survey Review Report to DOE | 0 | 0 | | 16DEC94A |
| D1 40060 | Validate Sample Results | 4 | 0 | 19DEC94A | 22DEC94A |
| D1 40061 | Prepare Survey Report | 5 | 0 | 9JAN95A | 9JAN95A |
| D1 40062 | Submit Survey Report to DOE | 0 | 0 | | 9JAN95A |
| D1 40063 | DOE Review Survey Report | 15 | 0 | 10JAN95A | 24JAN95A |




Activity Classification: Activity Type
HAMMOCK
MILESTONES

Plot Date 7MAR95
Data Date 6MAR95
Project Start 1AUG88
Project Finish 25AUG95

(c) Primavera Systems, Inc.

Activity Bar/Early Dates
Critical Activity
Progress Bar
Milestone/Flag Activity

S.T.S, Inc
Tanks 177 and 178 in PA

Sheet 1 of 1

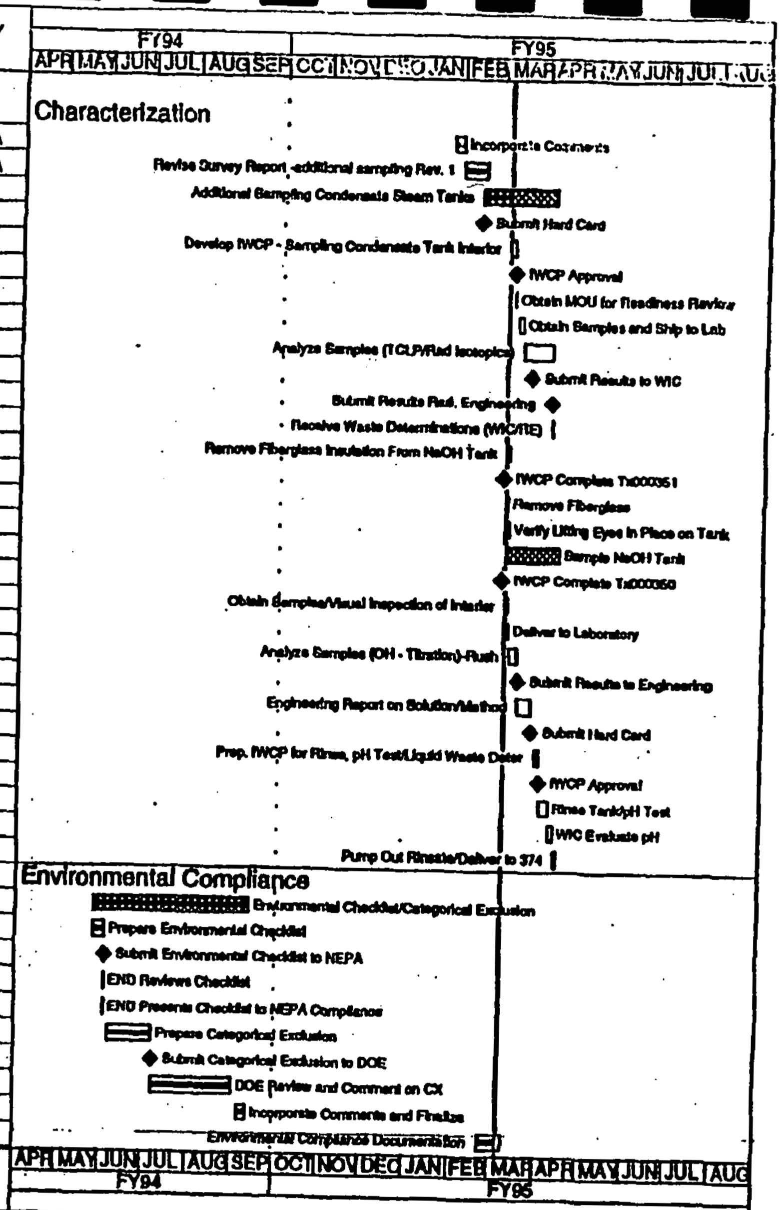
Decontamination & Decommissioning

| Date | Revision | Checked | Approved |
|---|---|---|---|
| | | | |

Pilot Project 4

Tanks 107, 108, NaOH tank

| ACTIVITY ID | ACTIVITY DESCRIPTION | ORIG DUR | REM DUR | EARLY START | EARLY FINISH |
|---|---|---|---|---|---|
| D1 40064 | Incorporate Comments | 5 | 0 | 25JAN95A | 31JAN95A |
| D1 40065 | Revise Survey Report -additional sampling Rev. 1 | 13 | 0 | 1FEB95A | 16FEB95A |
| 100 | Additional Sampling Condensate Steam Tanks | 38 | 24 | 14FEB95A | 6APR95 |
| 101 | Submit Hard Card | 0 | 0 | 14FEB95A | |
| 102 | Develop IWCP - Sampling Condensate Tank Interior | 4 | 4 | 6MAR95 | 9MAR95 |
| 103 | IWCP Approval | 0 | 0 | | 9MAR95 |
| 104 | Obtain MOU for Readiness Review | 1 | 1 | 10MAR95 | 10MAR95 |
| 105 | Obtain Samples and Ship to Lab | 3 | 3 | 13MAR95 | 15MAR95 |
| 106 | Analyze Samples (TCLP/Rad Isotopics) | 15 | 15 | 16MAR95 | 5APR95 |
| 107 | Submit Results to WIC | 0 | 0 | | 22MAR95 |
| 108 | Submit Results Rad. Engineering | 0 | 0 | | 5APR95 |
| 109 | Receive Waste Determinations (WIC/RE) | 1 | 1 | 6APR95 | 6APR95 |
| 110 | Remove Fiberglass Insulation From NaOH Tank | 3 | 3 | 6MAR95 | 8MAR95 |
| 111 | IWCP Complete Tx000351 | 0 | 0 | | 3MAR95 |
| 112 | Remove Fiberglass | 2 | 2 | 6MAR95 | 7MAR95 |
| 113 | Verify Lifting Eyes in Place on Tank | 1 | 1 | 8MAR95 | 8MAR95 |
| 114. | Sample NaOH Tank | 28 | 28 | 6MAR95 | 12APR95 |
| 115 | IWCP Complete Tx000350 | 0 | 0 | | 3MAR95 |
| 116 | Obtain Samples/Visual Inspection of Interior | 2 | 2 | 6MAR95 | 7MAR95 |
| 117 | Deliver to Laboratory | 1 | 1 | 8MAR95 | 8MAR95 |
| 118 | Analyze Samples (OH - Titration)-Rush | 4 | 4 | 9MAR95 | 14MAR95 |
| 119 | Submit Results to Engineering | 0 | 0 | | 14MAR95 |
| 120 | Engineering Report on Solution/Method | 8 | 8 | 15MAR95 | 24MAR95 |
| 121 | Submit Hard Card | 0 | 0 | | 24MAR95 |
| 122 | Prep. IWCP for Rinse, pH Test/Liquid Waste Deter | 4 | 4 | 27MAR95 | 30MAR95 |
| 123 | IWCP Approval | 0 | 0 | | 30MAR95 |
| 124 | Rinse Tank/pH Test | 5 | 5 | 31MAR95 | 6APR95 |
| 293 | WIC Evaluate pH | 2 | 2 | 7APR95 | 10APR95 |
| 125 | Pump Out Rinsate/Deliver to 374 | 2 | 2 | 11APR95 | 12APR95 |
| D1 40066 | Environmental Checklist/Categorical Exclusion | 75 | 0 | 26MAY94A | 12SEP94A |
| D1 40067 | Prepare Environmental Checklist | 5 | 0 | 26MAY94A | 3JUN94A |
| D1 40068 | Submit Environmental Checklist to NEPA | 0 | 0 | | 3JUN94A |
| D1 40069 | END Reviews Checklist | 10 | 0 | 3JUN94A | 3JUN94A |
| D1 40070 | END Presents Checklist to NEPA Compliance | 5 | 0 | 3JUN94A | 3JUN94A |
| D1 40071 | Prepare Categorical Exclusion | 14 | 0 | 6JUN94A | 7JUL94A |
| D1 40072 | Submit Categorical Exclusion to DOE | 0 | 0 | | 7JUL94A |
| D1 40073 | DOE Review and Comment on CX | 15 | 0 | 8JUL94A | 2SEP94A |
| D1 40074 | Incorporate Comments and Finalize | 5 | 0 | 6SEP94A | 12SEP94A |
| 292 | Environmental Compliance Documentation | 13 | 4 | 21FEB95A | 9MAR95 |




Activity Classification: Activity Type
HAMMOCK
MILESTONES

| | | | |
|---|---|---|---|
| Plot Date | 7MAR95 | | |
| Data Date | 6MAR95 | | |
| Project Start | 1AUG88 | | |
| Project Finish | 25AUG95 | | |

Activity Bar/Early Dates
Critical Activity
Progress Bar
Milestone/Flag Activity

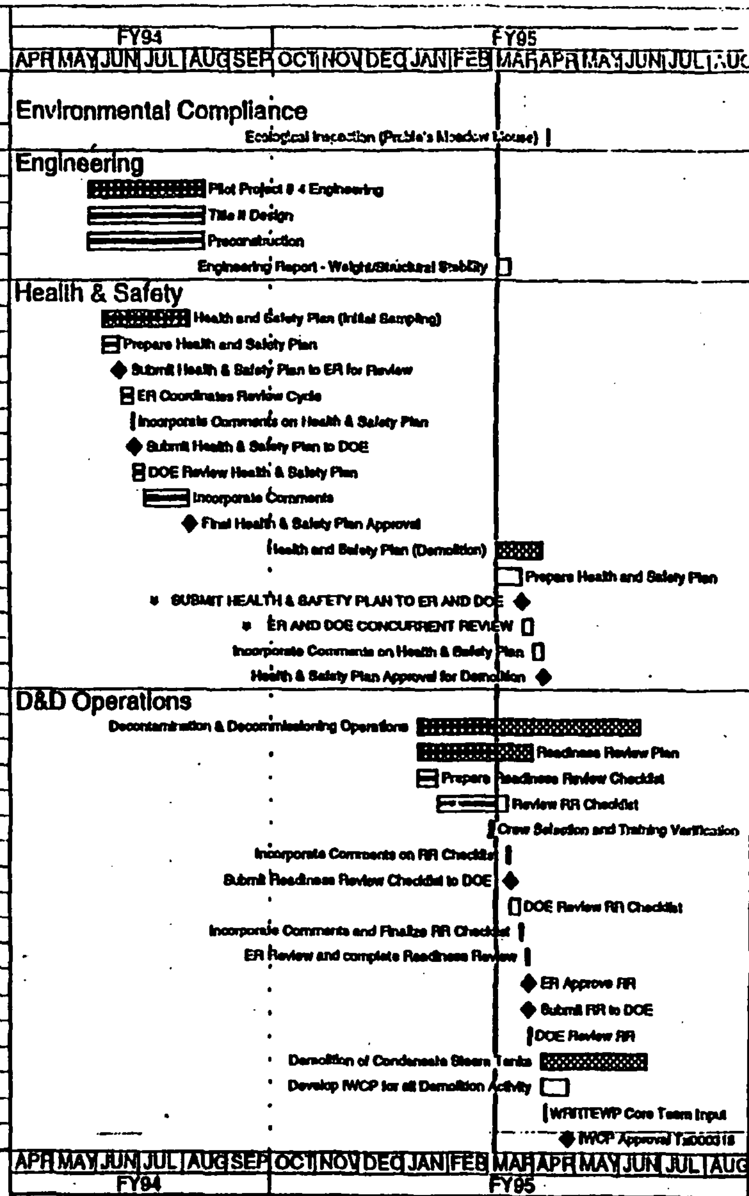
Sheet 1 of 1

EG&G R.F.E.T.C, Inc

Decontamination & Decommissioning

| Date | Revision | Checked | Approved |
|---|---|---|---|

| ACTIVITY ID | ACTIVITY DESCRIPTION | ORIG DUR | REM DUR | EARLY START | EARLY FINISH |
|---|---|---|---|---|---|
| **Environmental Compliance** | | | | | |
| 237 | Ecological Inspection (Preble's Meadow Mouse) | 1 | 1 | 10APR95 | 10APR95 |
| **Engineering** | | | | | |
| D1 40003 | Pilot Project # 4 Engineering | 55 | 0 | 27MAY94A | 15AUG94A |
| D1 40009 | Title II Design | 53 | 0 | 27MAY94A | 15AUG94A |
| D1 40010 | Preconstruction | 53 | 0 | 27MAY94A | 15AUG94A |
| 224 | Engineering Report - Weight/Structural Stability | 7 | 7 | 6MAR95 | 14MAR95 |
| **Health & Safety** | | | | | |
| D1 40076 | Health and Safety Plan (Initial Sampling) | 44 | 0 | 6JUN94A | 5AUG94A |
| D1 40077 | Prepare Health and Safety Plan | 10 | 0 | 6JUN94A | 17JUN94A |
| D1 40078 | Submit Health & Safety Plan to ER for Review | 0 | 0 | | 17JUN94A |
| D1 40079 | ER Coordinates Review Cycle | 5 | 0 | 20JUN94A | 27JUN94A |
| D1 40080 | Incorporate Comments on Health & Safety Plan | 5 | 0 | 27JUN94A | 28JUN94A |
| D1 40081 | Submit Health & Safety Plan to DOE | 0 | 0 | | 28JUN94A |
| D1 40082 | DOE Review Health & Safety Plan | 15 | 0 | 28JUN94A | 5JUL94A |
| D1 40083 | Incorporate Comments | 5 | 0 | 8JUL94A | 5AUG94A |
| D1 40084 | Final Health & Safety Plan Approval | 0 | 0 | | 5AUG94A |
| 980 | Health and Safety Plan (Demolition) | 24 | 24 | 6MAR95 | 6APR95 |
| 981 | Prepare Health and Safety Plan | 14 | 14 | 6MAR95 | 23MAR95 |
| 982 | SUBMIT HEALTH & SAFETY PLAN TO ER AND DOE | 0 | 0 | 24MAR95 | 23MAR95 |
| 983 | ER AND DOE CONCURRENT REVIEW | 5 | 5 | 24MAR95 | 30MAR95 |
| 984 | Incorporate Comments on Health & Safety Plan | 5 | 5 | 31MAR95 | 6APR95 |
| 985 | Health & Safety Plan Approval for Demolition | 0 | 0 | | 6APR95 |
| **D&D Operations** | | | | | |
| D1 40103 | Decontamination & Decommissioning Operations | 110 | 71 | 10JAN95A | 14JUN95 |
| D1 40085 | Readiness Review Plan | 56 | 19 | 10JAN95A | 30MAR95 |
| D1 40086 | Prepare Readiness Review Checklist | 10 | 0 | 10JAN95A | 23JAN95A |
| D1 40087 | Review RR Checklist | [illegible] | 5 | [illegible]95A | 13MAR95 |
| 227 | Crew Selection and Training Verification | 1 | 0 | 1MAR95A | 3MAR95A |
| D1 40088 | Incorporate Comments on RR Checklist | 2 | 2 | 14MAR95 | 15MAR95 |
| D1 40089 | Submit Readiness Review Checklist to DOE | 0 | 0 | | 15MAR95 |
| D1 40090 | DOE Review RR Checklist | 5 | 5 | 16MAR95 | 22MAR95 |
| D1 40091 | Incorporate Comments and Finalize RR Checklist | 2 | 2 | 23MAR95 | 24MAR95 |
| D1 40092 | ER Review and complete Readiness Review | 2 | 2 | 27MAR95 | 28MAR95 |
| D1 40093 | ER Approve RR | 0 | 0 | | 28MAR95 |
| D1 40094 | Submit RR to DOE | 0 | 0 | | 28MAR95 |
| D1 40095 | DOE Review RR | 2 | 2 | 29MAR95 | 30MAR95 |
| 229 | Demolition of Condensate Steam Tanks | 51 | 51 | 7APR95 | 20JUN95 |
| 230 | Develop IWCP for all Demolition Activity | 12 | 12 | 7APR95 | 25APR95 |
| 231 | WRRTEWP Core Team Input | 1 | 1 | 10APR95 | 10APR95 |
| 228 | IWCP Approval Tx000318 | 0 | 0 | | 25APR95 |




Activity Classification: Activity Type
HAMMOCK
MILESTONES

Plot Date 7MAR95
Data Date 6MAR95
Project Start 1AUG88
Project Finish 25AUG95

Activity Bar/Early Dates
Critical Activity
Progress Bar
Milestone/Flag Activity



EG&G R.F.E.T.S, Inc

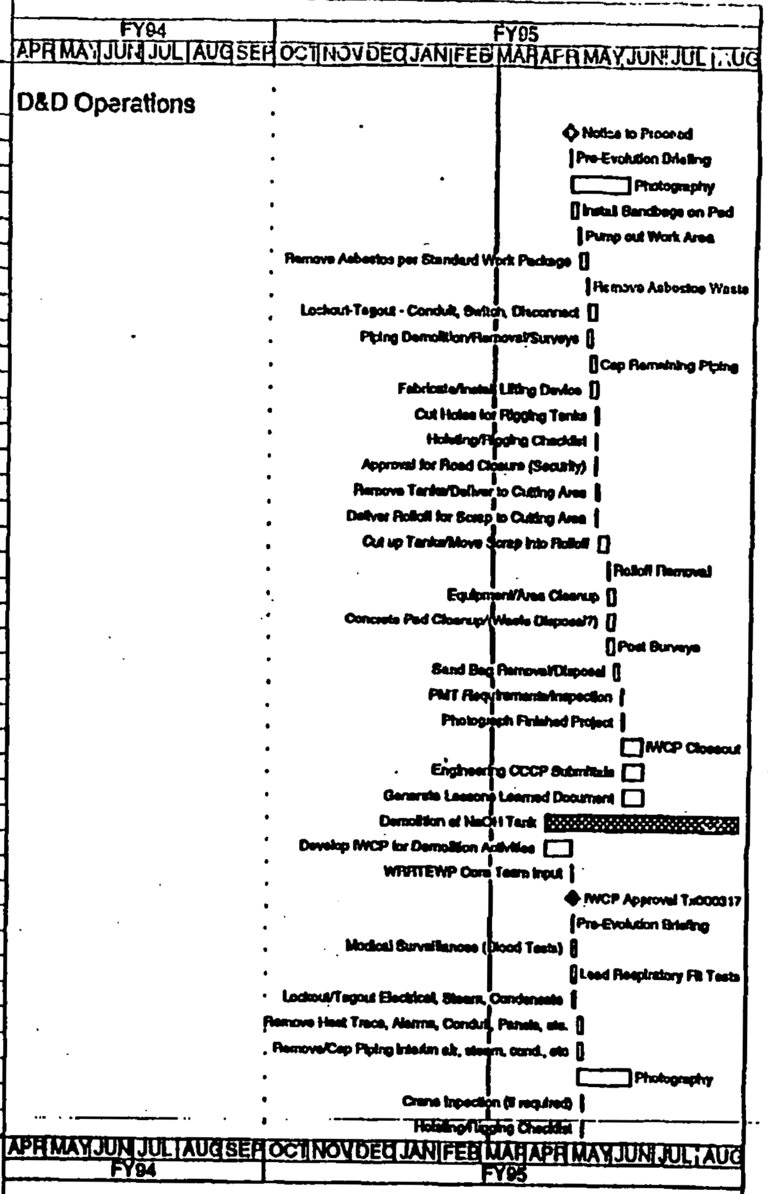
Sheet 3 of 5

Decontamination & Decommissioning

| Date | Revision | Checked | Approved |
|---|---|---|---|
| | | | |

7/32

| ACTIVITY ID | ACTIVITY DESCRIPTION | ORIG DUR | REM DUR | EARLY START | EARLY FINISH |
|---|---|---|---|---|---|
| 232 | Notice to Proceed | 0 | 0 | 23APR95 | |
| 233 | Pre-Evolution Briefing | 1 | 1 | 26APR95 | 26APR95 |
| 234 | Photography | 28 | 28 | 27APR95 | 6JUN95 |
| 235 | Install Sandbags on Pad | 3 | 3 | 27APR95 | 1MAY95 |
| 236 | Pump out Work Area | 2 | 2 | 2MAY95 | 3MAY95 |
| 237 | Remove Asbestos per Standard Work Package | 3 | 3 | 4MAY95 | 8MAY95 |
| 238 | Remove Asbestos Waste | 1 | 1 | 9MAY95 | 9MAY95 |
| 239 | Lockout-Tagout - Conduit, Switch, Disconnect | 4 | 4 | 10MAY95 | 15MAY95 |
| 240 | Piping Demolition/Removal/Surveys | 3 | 3 | 10MAY95 | 12MAY95 |
| 241 | Cap Remaining Piping | 2 | 2 | 12MAY95 | 15MAY95 |
| 246 | Fabricate/Install Lifting Device | 3 | 3 | 12MAY95 | 16MAY95 |
| 242 | Cut Holes for Rigging Tanks | 2 | 2 | 16MAY95 | 17MAY95 |
| 244 | Hoisting/Rigging Checklist | 1 | 1 | 16MAY95 | 16MAY95 |
| 245 | Approval for Road Closure (Security) | 1 | 1 | 16MAY95 | 16MAY95 |
| 247 | Remove Tanks/Deliver to Cutting Area | 2 | 2 | 17MAY95 | 18MAY95 |
| 290 | Deliver Rolloff for Scrap to Cutting Area | 1 | 1 | 17MAY95 | 17MAY95 |
| 248 | Cut up Tanks/Move Scrap into Rolloff | 5 | 5 | 19MAY95 | 25MAY95 |
| 249 | Rolloff Removal | 1 | 1 | 26MAY95 | 26MAY95 |
| 250 | Equipment/Area Cleanup | 2 | 2 | 26MAY95 | 30MAY95 |
| 251 | Concrete Pad Cleanup/(Waste Disposal?) | 2 | 2 | 26MAY95 | 30MAY95 |
| 252 | Post Surveys | 2 | 2 | 26MAY95 | 30MAY95 |
| 253 | Sand Bag Removal/Disposal | 3 | 3 | 31MAY95 | 2JUN95 |
| 254 | PMT Requirements/Inspection | 1 | 1 | 5JUN95 | 5JUN95 |
| 255 | Photograph Finished Project | 1 | 1 | 6JUN95 | 6JUN95 |
| 256 | IWCP Closeout | 10 | 10 | 6JUN95 | 19JUN95 |
| 257 | Engineering CCCP Submittals | 10 | 10 | 7JUN95 | 20JUN95 |
| 258 | Generate Lesson's Learned Document | 10 | 10 | 7JUN95 | 20JUN95 |
| 259 | Demolition of NaOH Tank | 94 | 94 | 13APR95 | 25AUG95 |
| 260 | Develop IWCP for Demolition Activities | 12 | 12 | 13APR95 | 1MAY95 |
| 261 | WRRTEWP Core Team Input | 1 | 1 | 2MAY95 | 2MAY95 |
| 262 | IWCP Approval Tx000317 | 0 | 0 | | 2MAY95 |
| 263 | Pre-Evolution Briefing | 1 | 1 | 3MAY95 | 3MAY95 |
| 273 | Medical Surveillances (Blood Tests) | 3 | 3 | 3MAY95 | 5MAY95 |
| 274 | Lead Respiratory Fit Tests | 3 | 3 | 3MAY95 | 5MAY95 |
| 265 | Lockout/Tagout Electrical, Steam, Condensate | 2 | 2 | 4MAY95 | 5MAY95 |
| 266 | Remove Heat Trace, Alarms, Conduit, Panels, etc. | 3 | 3 | 8MAY95 | 10MAY95 |
| 267 | Remove/Cap Piping interim air, steam, cond., etc | 3 | 3 | 8MAY95 | 10MAY95 |
| 272 | Photography | 27 | 27 | 8MAY95 | 14JUN95 |
| 268 | Crane Inpection (if required) | 1 | 1 | 11MAY95 | 11MAY95 |
| 269 | Hoisting/Rigging Checklist | 1 | 1 | 11MAY95 | 11MAY95 |




Activity Classification: Activity Type
HAMMOCK
MILESTONES

Plot Date 7MAR95
Data Date 8MAR95
Project Start 1AUG88
Project Finish 25AUG95

(c) Primavera Systems, Inc.

EG&G R.F.E.T.S, Inc

Sheet 4 of 8

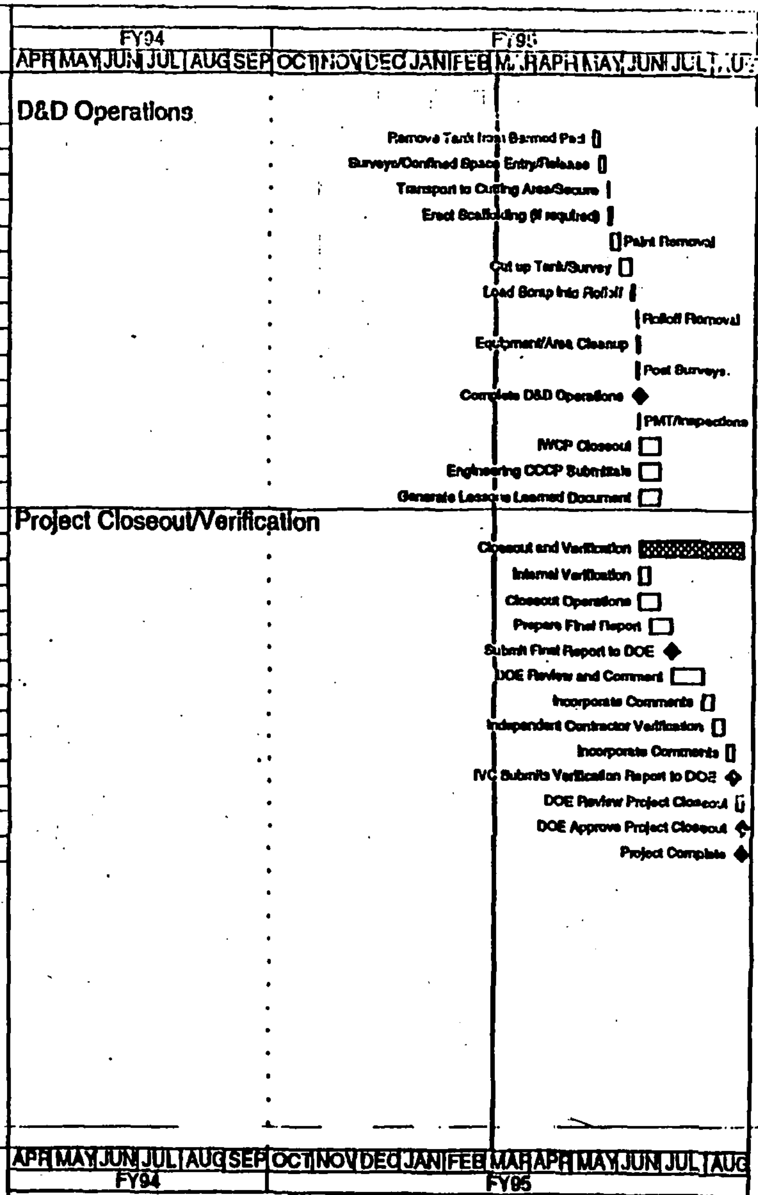
Decontamination & Decommissioning

| Date | Revision | Checked | Approved |
|---|---|---|---|
| | | | |

296

MAR 7 '95 10:13 FROM S M STOLLER CORP

| ACTIVITY ID | ACTIVITY DESCRIPTION | ORIG DUR | REM DUR | EARLY START | EARLY FINISH |
|---|---|---|---|---|---|
| | **D&D Operations** | | | | |
| 270 | Remove Tank from Bermed Pad | 2 | 2 | 12MAY95 | 15MAY95 |
| 271 | Surveys/Confined Space Entry/Release | 4 | 4 | 16MAY95 | 19MAY95 |
| 275 | Transport to Cutting Area/Secure | 1 | 1 | 22MAY95 | 22MAY95 |
| 276 | Erect Scaffolding (if required) | 2 | 2 | 23MAY95 | 24MAY95 |
| 277 | Paint Removal | 3 | 3 | 25MAY95 | 30MAY95 |
| 278 | Cut up Tank/Survey | 6 | 6 | 31MAY95 | 7JUN95 |
| 279 | Load Scrap into Rolloff | 2 | 2 | 8JUN95 | 9JUN95 |
| 280 | Rolloff Removal | 1 | 1 | 12JUN95 | 12JUN95 |
| 281 | Equipment/Area Cleanup | 2 | 2 | 12JUN95 | 13JUN95 |
| 282 | Post Surveys | 2 | 2 | 12JUN95 | 13JUN95 |
| D1 40902 | Complete D&D Operations | 0 | 0 | | 14JUN95 |
| 283 | PMT/Inspections | 1 | 1 | 14JUN95 | 14JUN95 |
| 284 | IWCP Closeout | 10 | 10 | 15JUN95 | 28JUN95 |
| 285 | Engineering CCCP Submittals | 10 | 10 | 15JUN95 | 28JUN95 |
| 286 | Generate Lessons Learned Document | 10 | 10 | 15JUN95 | 28JUN95 |
| | **Project Closeout/Verification** | | | | |
| D1 40119 | Closeout and Verification | 51 | 51 | 15JUN95 | 25AUG95 |
| D1 40120 | Internal Verification | 5 | 5 | 15JUN95 | 21JUN95 |
| D1 40121 | Closeout Operations | 10 | 10 | 15JUN95 | 28JUN95 |
| D1 40122 | Prepare Final Report | 10 | 10 | 22JUN95 | 6JUL95 |
| D1 40123 | Submit Final Report to DOE | 0 | 0 | | 6JUL95 |
| D1 40124 | *DOE Review and Comment* | 15 | 15 | 7JUL95 | 27JUL95 |
| D1 40125 | Incorporate Comments | 5 | 5 | 28JUL95 | 3AUG95 |
| D1 40126 | Independent Contractor Verification | 6 | 6 | 4AUG95 | 11AUG95 |
| D1 40127 | Incorporate Comments | 5 | 5 | 14AUG95 | 18AUG95 |
| D1 40128 | IVC Submits Verification Report to DOE | 0 | 0 | | 18AUG95 |
| D1 40129 | DOE Review Project Closeout | 3 | 3 | 21AUG95 | 23AUG95 |
| D1 40130 | DOE Approve Project Closeout | 0 | 0 | | 25AUG95 |
| D1 40131 | Project Complete | 0 | 0 | | 25AUG95 |




Activity Classification: Activity Type
HAMMOCK
MILESTONES

| | |
|---|---|
| Plot Date | 7MAR95 |
| Data Date | 6MAR95 |
| Project Start | 1AUG88 |
| Project Finish | 25AUG95 |

Activity Bar/Early Dates
Critical Activity
Progress Bar
Milestone/Flag Activity



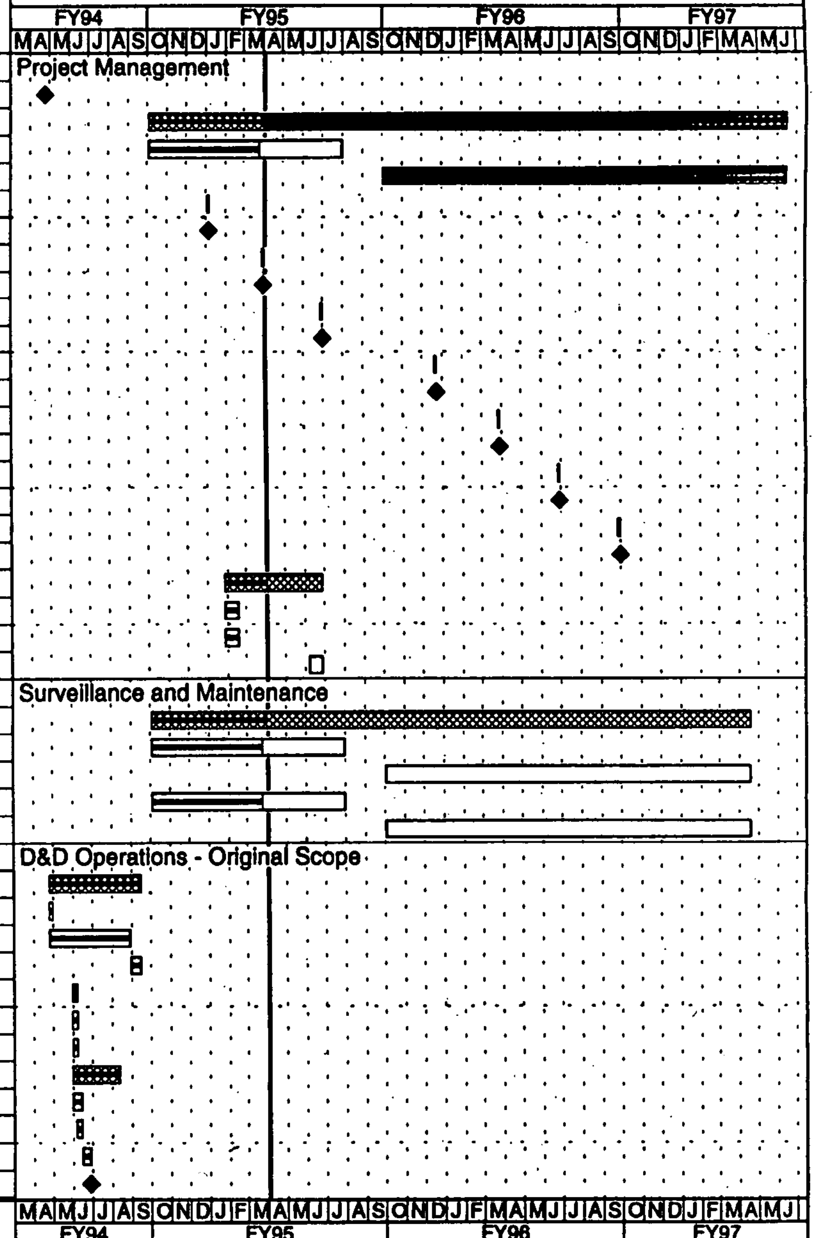
EG&G R.F.E.T.S. Inc

Decontamination & Decommissioning

| Date | Revision | Checked | Approved |
|---|---|---|---|

TOTAL P.05

| ACTIVITY ID | ACTIVITY DESCRIPTION | ORIG DUR | REM DUR | EARLY START | EARLY FINISH |
|---|---|---|---|---|---|
| **Project Management** | | | | | |
| 10 | Building 889 D3 Start | 0 | 0 | 24APR94A | |
| 309 | Project Management | 672 | 550 | 3OCT94A | 16JUN97 |
| 308 | Project Management Building 889 | 195 | 83 | 3OCT94A | 31JUL95 |
| 308A | Project Management Building 889 | 424 | 424 | 2OCT95 | 16JUN97 |
| 240 | Develop Lessons Learned | 3 | 0 | 3JAN95A | 5JAN95A |
| 250 | Submit Lessons Learned to DOE | 0 | 0 | | 5JAN95A |
| 241 | Develop Lessons Learned | 3 | 0 | 29MAR95A | 31MAR95A |
| 251 | Submit Lessons Learned to DOE | 0 | 0 | | 31MAR95A |
| 242 | Develop Lessons Learned | 3 | 3 | 28JUN95 | 30JUN95 |
| 252 | Submit Lessons Learned to DOE | 0 | 0 | | 30JUN95 |
| 1000 | Develop Lessons Learned | 3 | 3 | 20DEC95 | 22DEC95 |
| 1500 | Submit Lessons Learned to DOE | 0 | 0 | | 22DEC95 |
| 2000 | Develop Lessons Learned | 3 | 3 | 26MAR96 | 28MAR96 |
| 1600 | Submit Lessons Learned to DOE | 0 | 0 | | 28MAR96 |
| 3000 | Develop Lessons Learned | 3 | 3 | 26JUN96 | 28JUN96 |
| 1700 | Submit Lessons Learned to DOE | 0 | 0 | | 28JUN96 |
| 4000 | Develop Lessons Learned | 3 | 3 | 26SEP96 | 30SEP96 |
| 1800 | Submit Lessons Learned to DOE | 0 | 0 | | 30SEP96 |
| 229 | APENS/NPDES Evaluation | 106 | 60 | 27JAN95A | 27JUN95 |
| 230 | APENS Evaluation-Deactivation | 15 | 0 | 27JAN95A | 17FEB95A |
| 231 | NPDES Evaluation | 15 | 0 | 27JAN95A | 17FEB95A |
| 232 | APENS Evaluation-Demolition | 15 | 15 | 7JUN95 | 27JUN95 |
| **Surveillance and Maintenance** | | | | | |
| 459 | Surveillance & Maintenance | 632 | 510 | 3OCT94A | 18APR97 |
| 461 | RCRA Inspections | 195 | 83 | 3OCT94A | 31JUL95 |
| 461A | RCRA Inspections | 384 | 384 | 2OCT95 | 18APR97 |
| 462 | Maintenance | 195 | 83 | 3OCT94A | 31JUL95 |
| 462A | Maintenance | 384 | 384 | 2OCT95 | 18APR97 |
| **D&D Operations - Original Scope** | | | | | |
| 50037 | D&D Operations - Original Scope | 101 | 0 | 25APR94A | 15SEP94A |
| 50038 | Photographs at Project Initiation | 5 | 0 | 25APR94A | 29APR94A |
| 50004 | Prepare Technical Scope and Estimate | 49 | 0 | 25APR94A | 29AUG94A |
| 50008 | Title II Design - Deactivation | 128 | 0 | 30AUG94A | 15SEP94A |
| 50127 | Project Specific Pre-Planning | 6 | 0 | 31MAY94A | 7JUN94A |
| 50128 | Equipment Inventory | 10 | 0 | 31MAY94A | 7JUN94A |
| 50129 | Facility History and Report | 5 | 0 | 1JUN94A | 7JUN94A |
| 50101 | Security Plan | 53 | 0 | 31MAY94A | 12AUG94A |
| 50102 | Prepare Security Plan | 15 | 0 | 31MAY94A | 14JUN94A |
| 50103 | Review Security Plan | 10 | 0 | 6JUN94A | 14JUN94A |
| 50104 | Incorporate Comments | 5 | 0 | 15JUN94A | 28JUN94A |
| 50105 | Submit Security Plan to DOE | 0 | 0 | | 28JUN94A |




Activity Classification: Activity Type
Hammock
Milestone

Plot Date 6APR95
Data Date 6APR95
Project Start 1APR94
Project Finish 16JUN97

Activity Bar/Early Dates
Critical Activity
Progress Bar
Milestone/Flag Activity

8891

Sheet 1 of 8

# EG&G R.F.E.T.S., Inc.
## BLDG 889 COMPLETE DEMOLITION
## WORK PKG 13003 LIFECYCLE SHEDULE

WORKING SCHEDULE

| Date | Revision | Checked | Approved |
|---|---|---|---|
| | | | |



297

| ACTIVITY ID | ACTIVITY DESCRIPTION | ORIG DUR | REM DUR | EARLY START | EARLY FINISH |
|---|---|---|---|---|---|
| | **D&D Operations - Original Scope** | | | | |
| 50106 | DOE Review Security Plan | 15 | 0 | 29JUN94A | 5AUG94A |
| 50107 | Incorporate Comments | 5 | 0 | 8AUG94A | 12AUG94A |
| | **Davis-Bacon Determination** | | | | |
| 205 | Davis-Bacon | 138 | 0 | 25APR94A | 3NOV94A |
| 50003 | Prepare Davis-Bacon Determination | 5 | 0 | 25APR94A | 29APR94A |
| 50005 | Submit Davis-Bacon Determination | 0 | 0 | | 29APR94A |
| 50006 | Davis-Bacon Determinations | 15 | 0 | 2MAY94A | 20MAY94A |
| 50007 | Davis-Bacon Decision | 0 | 0 | | 20MAY94A |
| 206 | Revise Davis-Bacon Determination | 10 | 0 | 3OCT94A | 14OCT94A |
| 901 | Submit Revised Davis-Bacon Determination | 0 | 0 | | 14OCT94A |
| 207 | Davis-Bacon Determinations | 10 | 0 | 17OCT94A | 28OCT94A |
| 208 | Davis-Bacon Decision | 8 | 0 | 31OCT94A | 3NOV94A |
| | **Health & Safety (Deactivation)** | | | | |
| 50042 | Health & Safety Plan (Deactivation) | 98 | 0 | 5JUL94A | 18NOV94A |
| 50043 | Prepare Health & Safety Plan | 10 | 0 | 5JUL94A | 14SEP94A |
| 50044 | Submit Health & Safety Plan to ER for Review | 0 | 0 | | 14SEP94A |
| 50045 | ER Coordinates Review Cycle | 5 | 0 | 15SEP94A | 30SEP94A |
| 50047 | Incorporate ER Comments | 20 | 0 | 7OCT94A | 21OCT94A |
| 50048 | DOE Review Health & Safety Plan | 15 | 0 | 24OCT94A | 4NOV94A |
| 50049 | Incorporate DOE Comments | 10 | 0 | 7NOV94A | 18NOV94A |
| 50050 | Final Health & Safety Plan Approval | 0 | 0 | | 18NOV94A |
| | **Site Use Review Board (SURB)** | | | | |
| 212 | Site Use Review Board (SURB) | 18 | 0 | 17OCT94A | 9NOV94A |
| 209 | Reapply to SURB - Prepare documentation | 15 | 0 | 17OCT94A | 28OCT94A |
| 210 | SURB Review | 3 | 0 | 31OCT94A | 4NOV94A |
| 902 | Submit to SURB for Approval | 0 | 0 | | 4NOV94A |
| 211 | SURB Approval | 0 | 0 | | 9NOV94A |
| | **NEPA Regulatory Compliance** | | | | |
| 50114 | NEPA Regulatory Compliance | 215 | 5 | 27MAY94A | 7APR95 |
| 50117 | Environmental Checklist/Cat Ex Deactivation | 115 | 0 | 27MAY94A | 8NOV94A |
| 50118 | Prepare Environ Checklist/Cat. Ex. Deactivation | 5 | 0 | 27MAY94A | 3JUN94A |
| 50119 | Submit Environmental Checklist to NEPA Deact | 0 | 0 | | 3JUN94A |
| 50120 | END Review Checklist Deactivation | 10 | 0 | 3JUN94A | 3JUN94A |
| 50121 | END Presents Checklist to NEPA Compliance Deact | 5 | 0 | 3JUN94A | 3JUN94A |
| 50122 | Prepare Categorical Exclusion for Deactivation | 14 | 0 | 6JUN94A | 7JUL94A |
| 50123 | Submit Categorical Exclusion to DOE | 0 | 0 | | 7JUL94A |
| 50124 | DOE Review and Comment on CX for Deactivation | 15 | 0 | 8JUL94A | 2SEP94A |
| 50125 | Incorporate Comments and Finalize Deactivation | 5 | 0 | 6SEP94A | 8NOV94A |
| 224 | Estimate Waste Types and Volumes | 10 | 0 | 8NOV94A | 21NOV94A |
| 50183 | Submittal of Approved SURB to NEPA | 15 | 0 | 10NOV94A | 25NOV94A |
| 199 | Environmental Checklist/NEPA Documentation | 91 | 5 | 22NOV94A | 7APR95 |

FY94 FY95 FY96 FY97

M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J

Activity Classification: Activity Type
Hammock
Milestone

Plot Date 6APR95
Data Date 3APR95
Project Start 1APR94
Project Finish 16JUN97

(c) Primavera Systems, Inc.

Activity Bar/Early Dates
Critical Activity
Progress Bar
Milestone/Flag Activity

8891

Sheet 2 of 8

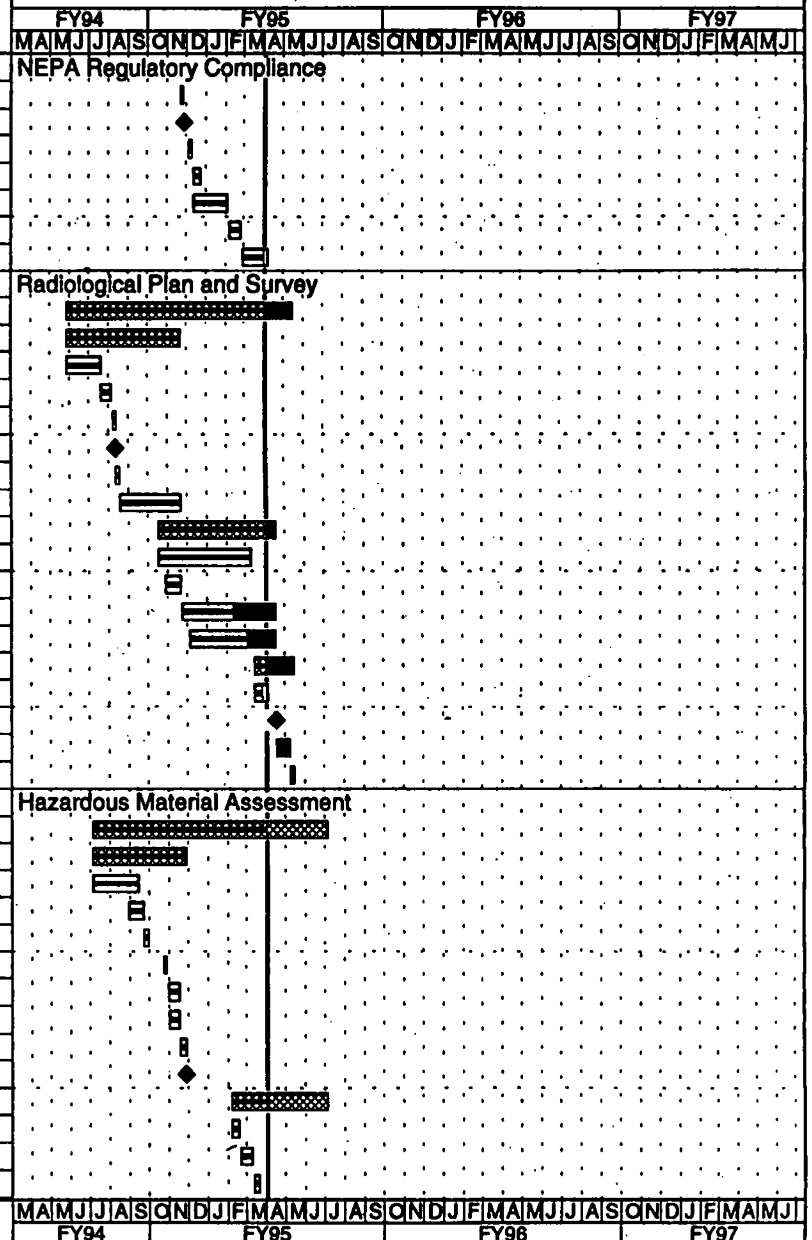
EG&G R.F.E.T.S., Inc.
BLDG 889 COMPLETE DEMOLITION
WORK PKG 13003 LIFECYCLE SHEDULE

WORKING SCHEDULE

| Date | Revision | Checked | Approved |
|---|---|---|---|
| | | | |

298

| ACTIVITY ID | ACTIVITY DESCRIPTION | ORIG DUR | REM DUR | EARLY START | EARLY FINISH |
|---|---|---|---|---|---|
| | **NEPA Regulatory Compliance** | | | | |
| 200 | Revise Environmental Checklist | 5 | 0 | 22NOV94A | 25NOV94A |
| 900 | Submit Environmental Checklist/NEPA Doc. | 0 | 0 | | 25NOV94A |
| 450 | END Committee Review of NEPA Checklist | 5 | 0 | 5DEC94A | 9DEC94A |
| 201 | Prepare Categorical Exclusion for Deactivation | 5 | 0 | 12DEC94A | 23DEC94A |
| 50184 | NEPA Redetermination of CX or EA for D&D | 15 | 0 | 12DEC94A | 3FEB95A |
| 203 | DOE Review and Comment on CX | 15 | 0 | 6FEB95A | 24FEB95A |
| 50185 | DOE Approval NEPA CX for Demolition | 30 | 5 | 27FEB95A | 7APR95 |
| | **Radiological Plan and Survey** | | | | |
| 50046 | Radiological Plan & Survey | 240 | 30 | 27MAY94A | 15MAY95 |
| 50051 | Sampling and Analysis/ALARA Plan | 124 | 0 | 27MAY94A | 21NOV94A |
| 50052 | Prepare Sampling and Analysis/ALARA Plan | 11 | 0 | 27MAY94A | 20JUL94A |
| 50053 | Internal Review Sampling/ALARA Plan | 10 | 0 | 20JUL94A | 5AUG94A |
| 50054 | Incorporate Comments | 5 | 0 | 8AUG94A | 12AUG94A |
| 50055 | Submit Sampling Plan to DOE | 0 | 0 | | 12AUG94A |
| 50056 | DOE Review and Comment on Sampling Plan | 15 | 0 | 12AUG94A | 17AUG94A |
| 50057 | Incorporate Comments and Finalize | 5 | 0 | 18AUG94A | 21NOV94A |
| 50000 | Radiological Survey | 122 | 10 | 17OCT94A | 17APR95 |
| 50059 | Radiological Survey Removable Equipment | 30 | 0 | 17OCT94A | 10MAR95A |
| 50058 | Build Scaffolding/Construct Radiological Grid | 10 | 0 | 28OCT94A | 21NOV94A |
| 50060 | Radiological Survey of Fixed Equipment | 22 | 10 | 23NOV94A | 17APR95 |
| 50061 | Survey Interior of Building | 30 | 10 | 5DEC94A | 17APR95 |
| 50062 | Radiological/ALARA Review | 43 | 30 | 15MAR95A | 15MAY95 |
| 50063 | Prepare Radiological/ALARA Review | 5 | 2 | 15MAR95A | 4APR95 |
| 50064 | Submit ALARA Review Radiological Engineering | 0 | 0 | | 17APR95 |
| 50065 | Incorporate Comments | 15 | 15 | 18APR95 | 8MAY95 |
| 50066 | Incorporate ALARA Plan | 5 | 5 | 9MAY95 | 15MAY95 |
| | **Hazardous Material Assessment** | | | | |
| 50073 | Hazardous Material Assessment | 250 | 65 | 5JUL94A | 5JUL95 |
| 50072 | Hazardous Material Plan | 102 | 0 | 5JUL94A | 28NOV94A |
| 50074 | Prepare Hazardous Material Survey Plan | 15 | 0 | 5JUL94A | 14SEP94A |
| 50075 | Review Hazardous Material Survey Plan | 10 | 0 | 30AUG94A | 22SEP94A |
| 50076 | Incorporate Comments | 5 | 0 | 23SEP94A | 29SEP94A |
| 50082 | Conduct Hazardous Material Survey | 5 | 0 | 24OCT94A | 27OCT94A |
| 50091 | Prepare Hazardous Material/Asbestos Asst Report | 10 | 0 | 31OCT94A | 17NOV94A |
| 50093 | Incorp Haz Material/Asbestos Asst Rpt Comments | 5 | 0 | 1NOV94A | 17NOV94A |
| 50092 | Review Hazardous Material/Asbestos Asst Report | 5 | 0 | 18NOV94A | 28NOV94A |
| 50094 | Submit Haz Material/Asbestos Asst Rpt to DOE | 0 | 0 | | 28NOV94A |
| 50096 | Asbestos Removal Activities | 105 | 65 | 6FEB95A | 5JUL95 |
| 50090 | Sitewide Ind. Hyg. Asbestos Sampling Plan | 10 | 0 | 6FEB95A | 17FEB95A |
| 316 | Develop Statement of Work (SOW) | 15 | 0 | 20FEB95A | 10MAR95A |
| 317 | S.O.W. Review by EG&G | 7 | 0 | 13MAR95A | 21MAR95A |




Activity Classification: Activity Type
Hammock
Milestone

| | |
|---|---|
| Plot Date | 6APR95 |
| Data Date | 3APR95 |
| Project Start | 1APR94 |
| Project Finish | 16JUN97 |

(c) Primavera Systems, Inc.

Activity Bar/Early Dates
Critical Activity
Progress Bar
Milestone/Flag Activity

8891

Sheet 3 of 8

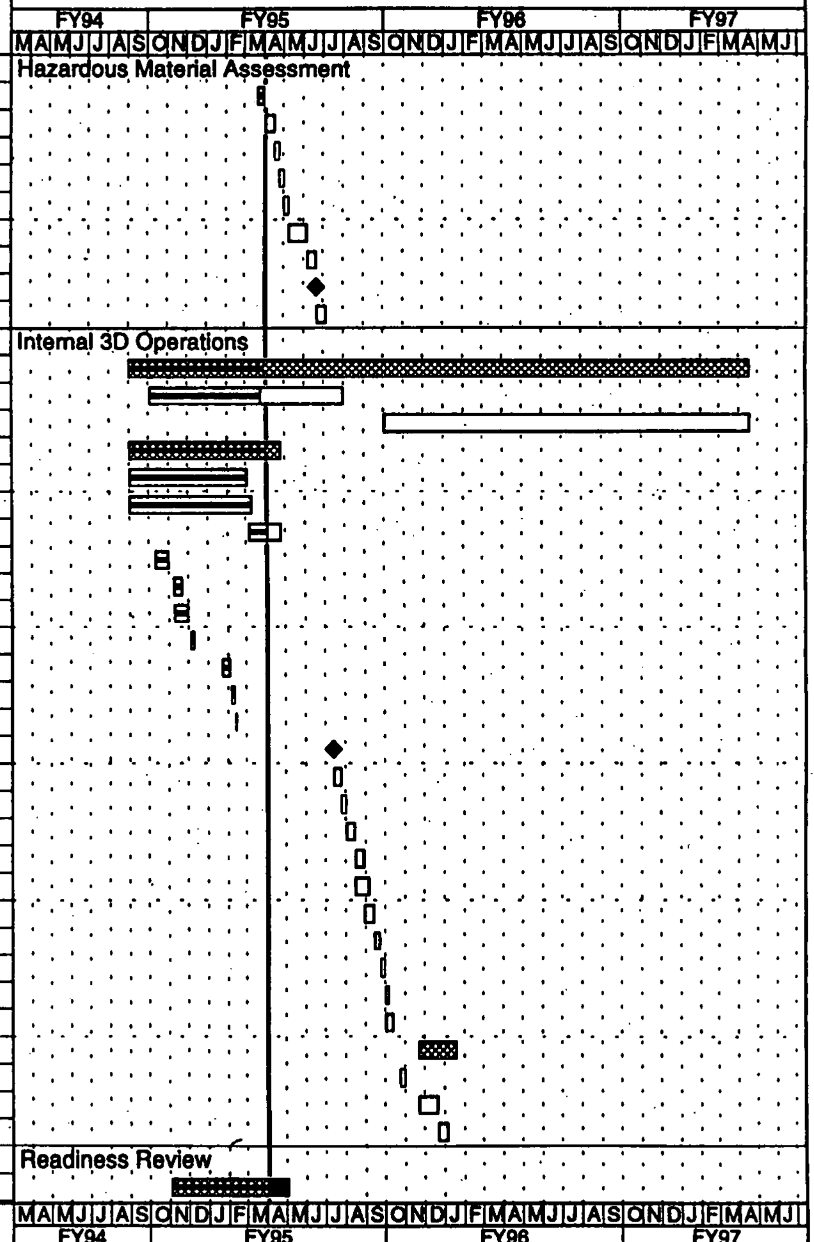
**EG&G R.F.E.T.S., Inc.**
**BLDG 889 COMPLETE DEMOLITION**
**WORK PKG 13003 LIFECYCLE SHEDULE**

WORKING SCHEDULE

| Date | Revision | Checked | Approved |
|---|---|---|---|
| | | | |

299

| ACTIVITY ID | ACTIVITY DESCRIPTION | ORIG DUR | REM DUR | EARLY START | EARLY FINISH |
|---|---|---|---|---|---|
| | **Hazardous Material Assessment** | | | | |
| 318 | Incorporate Comments | 8 | 0 | 22MAR95A | 31MAR95A |
| 321 | Solicit SOW to Bidders | 10 | 10 | 3APR95 | 17APR95 |
| 326 | Evaluate Bidders | 5 | 5 | 18APR95 | 24APR95 |
| 331 | Award Contract | 5 | 5 | 25APR95 | 1MAY95 |
| 50095 | Asbestos Sampling | 5 | 5 | 2MAY95 | 8MAY95 |
| 50100 | Analyze Samples | 20 | 20 | 9MAY95 | 6JUN95 |
| 50110 | Develop Asbestos Results Report | 10 | 10 | 7JUN95 | 20JUN95 |
| 50115 | Submit Asbestos Results Report | 0 | 0 | | 20JUN95 |
| 50116 | Asbestos Removal | 10 | 10 | 21JUN95 | 5JUL95 |
| | **Internal 3D Operations** | | | | |
| 289 | Internal 3D Operations | 653 | 510 | 1SEP94A | 18APR97 |
| 460 | Building Walkdowns | 195 | 83 | 3OCT94A | 31JUL95 |
| 460A | Building Walkdowns | 384 | 384 | 2OCT95 | 18APR97 |
| 50145 | Decon/Remove Reusable Equipment | 158 | 15 | 1SEP94A | 24APR95 |
| 50147 | Remove Reusable Equipment | 10 | 0 | 1SEP94A | 3MAR95A |
| 50146 | Decontaminate Reusable Equipment | 10 | 0 | 1SEP94A | 10MAR95A |
| 50148 | Equipment Staging PU&D | 35 | 15 | 6MAR95A | 24APR95 |
| 101 | EO - HVAC Removal - Deactivation | 15 | 0 | 11OCT94A | 31OCT94A |
| 225 | Prepare New Rad. Evaluation | 10 | 0 | 8NOV94A | 21NOV94A |
| 119 | IWCP Development (C) - Furniture Removal | 15 | 0 | 9NOV94A | 30NOV94A |
| 280 | Remove Furniture (Admin. Area) | 5 | 0 | 5DEC94A | 9DEC94A |
| 50180 | IWCP Dev. (B)-Existing Title II Design-Deact. | 10 | 0 | 23JAN95A | 3FEB95A |
| 144 | Approval Period - Title II Design-Deact. IWCP | 5 | 0 | 6FEB95A | 10FEB95A |
| 102 | Safety Screen - HVAC Removal | 1 | 0 | 13FEB95A | 13FEB95A |
| 50143 | ER/QA Notice to Proceed-Deactivation | 0 | 0 | 14JUL95 | |
| 50144 | Mobilize Work Force | 8 | 8 | 14JUL95 | 25JUL95 |
| 301 | Remove Equipment from Room 112 | 5 | 5 | 26JUL95 | 1AUG95 |
| 300 | Remove Equipment from RCA | 10 | 10 | 2AUG95 | 15AUG95 |
| 302 | Disconnect Elec. and Remove HVAC from 104 Mezz. | 10 | 10 | 16AUG95 | 29AUG95 |
| 50039 | Equipment Removal (photos) | 15 | 15 | 16AUG95 | 6SEP95 |
| 303 | Disconnect Elec. and Remove Crusher & Baler | 10 | 10 | 30AUG95 | 13SEP95 |
| 304 | Disconnect Elec. and Remove Health Physics | 7 | 7 | 14SEP95 | 22SEP95 |
| 305 | Disconnect Utilities and Steam Service to Rm 108 | 5 | 5 | 25SEP95 | 29SEP95 |
| 307 | Disconnect and Remove HVAC from Rm 105 | 5 | 5 | 2OCT95 | 6OCT95 |
| 306 | Remove Process Waste Piping from Rm 112 to 108 | 10 | 10 | 2OCT95 | 13OCT95 |
| 260 | Filter Plenum | 35 | 35 | 22NOV95 | 19JAN96 |
| 271 | Disconnect Utilities to Trailer T889A | 5 | 5 | 25OCT95 | 31OCT95 |
| 288 | Remove Clean Filter Plenum Rm. 112 | 20 | 20 | 22NOV95 | 21DEC95 |
| 261 | Remove HVAC Ducts | 5 | 5 | 22DEC95 | 5JAN96 |
| | **Readiness Review** | | | | |
| 50130 | Readiness Review Checklist-Deactivation | 121 | 22 | 3NOV94A | 3MAY95 |




Activity Classification: Activity Type
Hammock
Milestone

| | |
|---|---|
| Plot Date | 6APR95 |
| Data Date | 3APR95 |
| Project Start | 1APR94 |
| Project Finish | 16JUN97 |

(c) Primavera Systems, Inc.

Activity Bar/Early Dates
Critical Activity
Progress Bar
Milestone/Flag Activity

8891

Sheet 4 of 8

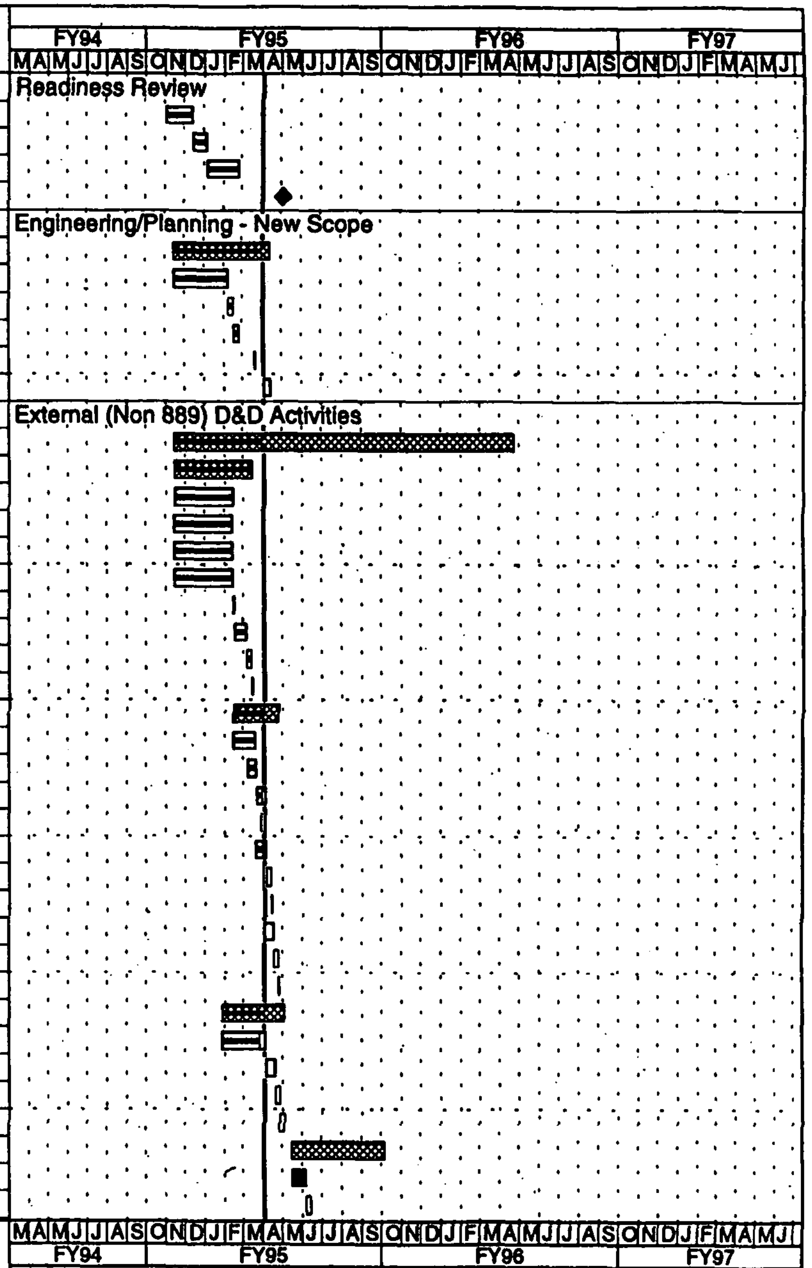
EG&G R.F.E.T.S., Inc.
BLDG 889 COMPLETE DEMOLITION
WORK PKG 13003 LIFECYCLE SHEDULE

WORKING SCHEDULE

| Date | Revision | Checked | Approved |
|---|---|---|---|
| | | | |

300

| ACTIVITY ID | ACTIVITY DESCRIPTION | ORIG DUR | REM DUR | EARLY START | EARLY FINISH |
|---|---|---|---|---|---|
| 50131 | Prepare Readiness Review Checklist | 10 | 0 | 3NOV94A | 14DEC94A |
| 50132 | Review RR Checklist | 10 | 0 | 15DEC94A | 5JAN95A |
| 50133 | Incorporate Comments on RR Checklist | 5 | 0 | 6JAN95A | 24FEB95A |
| 50134 | Submit Readiness Review Checklist to DOE | 0 | 0 | | 3MAY95 |
| 50002 | Engineering-Deactivation | 101 | 9 | 14NOV94A | 13APR95 |
| 50020 | Prepare Deactivation Plan for B889 | 20 | 0 | 14NOV94A | 7FEB95A |
| 50021 | Issue Deactivation Plan for Review | 5 | 0 | 8FEB95A | 15FEB95A |
| 50022 | Incorporate Comments and Finalize Deact Plan | 5 | 0 | 16FEB95A | 24FEB95A |
| 50023 | Signature Approval | 5 | 0 | 20MAR95A | 21MAR95A |
| 50024 | Distribute Deactivation Plan | 9 | 9 | 3APR95A | 13APR95 |
| 99 | External (Non Bldg) D&D Activities | 356 | 264 | 14NOV94A | 23APR96 |
| 100 | Revise Title II Engineering - D&D | 80 | 0 | 14NOV94A | 15MAR95A |
| 104 | EO - Utilities Removal (Water, Electrical, Etc.) | 15 | 0 | 14NOV94A | 13FEB95A |
| 110 | EO - Trailer T889A Removal | 15 | 0 | 14NOV94A | 13FEB95A |
| 113 | EO - Filter Plenum Removal | 15 | 0 | 14NOV94A | 13FEB95A |
| 116 | EO - Structure Removal | 15 | 0 | 14NOV94A | 13FEB95A |
| 120 | Distribute EOs | 2 | 0 | 14FEB95A | 15FEB95A |
| 121 | Review of EOs | 10 | 0 | 16FEB95A | 6MAR95A |
| 122 | Incorporate Comments | 5 | 0 | 7MAR95A | 13MAR95A |
| 123 | Distribute Final EOs | 2 | 0 | 14MAR95A | 15MAR95A |
| 107 | IWCP/Safety Screen | 50 | 16 | 14FEB95A | 25APR95 |
| 117 | USQD - Structure Removal | 15 | 0 | 14FEB95A | 20MAR95A |
| 106 | IWCP Development (B) - Utilities Removal | 10 | 0 | 8MAR95A | 21MAR95A |
| 141 | Approval Period - Utilities Removal IWCP | 5 | 2 | 22MAR95A | 4APR95 |
| 105 | Safety Screen - Utilities Removal | 1 | 0 | 29MAR95A | 29MAR95A |
| 112 | IWCP Development (C) - Trailer T889A Removal | 10 | 3 | 20MAR95A | 5APR95 |
| 142 | Approval Period - Trailer T889A Removal IWCP | 5 | 5 | 6APR95 | 12APR95 |
| 111 | Safety Screen - Trailer T889A Removal | 1 | 1 | 13APR95 | 13APR95 |
| 115 | IWCP Development (B) - Filter Plenum Removal | 10 | 10 | 3APR95 | 17APR95 |
| 143 | Approval Period - Filter Plenum Removal IWCP | 5 | 5 | 18APR95 | 24APR95 |
| 114 | Safety Screen Filter Plenum Removal | 1 | 1 | 25APR95 | 25APR95 |
| 595 | Procurement | 68 | 22 | 27JAN95A | 3MAY95 |
| 600 | Develop Statement of Work (SOW) | 15 | 2 | 27JAN95A | 4APR95 |
| 605 | Solicit SOW to Bidders | 10 | 10 | 5APR95 | 19APR95 |
| 610 | Evaluate Bidders | 5 | 5 | 20APR95 | 26APR95 |
| 615 | Award Contract | 5 | 5 | 27APR95 | 3MAY95 |
| 909 | External D&D Work Plan | 101 | 101 | 16MAY95 | 6OCT95 |
| 910 | External D&D Work Plan | 15 | 15 | 16MAY95 | 6JUN95 |
| 915 | EG&G Review | 5 | 5 | 7JUN95 | 13JUN95 |




Activity Classification: Activity Type
Hammock
Milestone

Plot Date 6APR95
Data Date 3APR95
Project Start 1APR94
Project Finish 16JUN97

(c) Primavera Systems, Inc.

Activity Bar/Early Dates
Critical Activity
Progress Bar
Milestone/Flag Activity

6891

Sheet 5 of 8

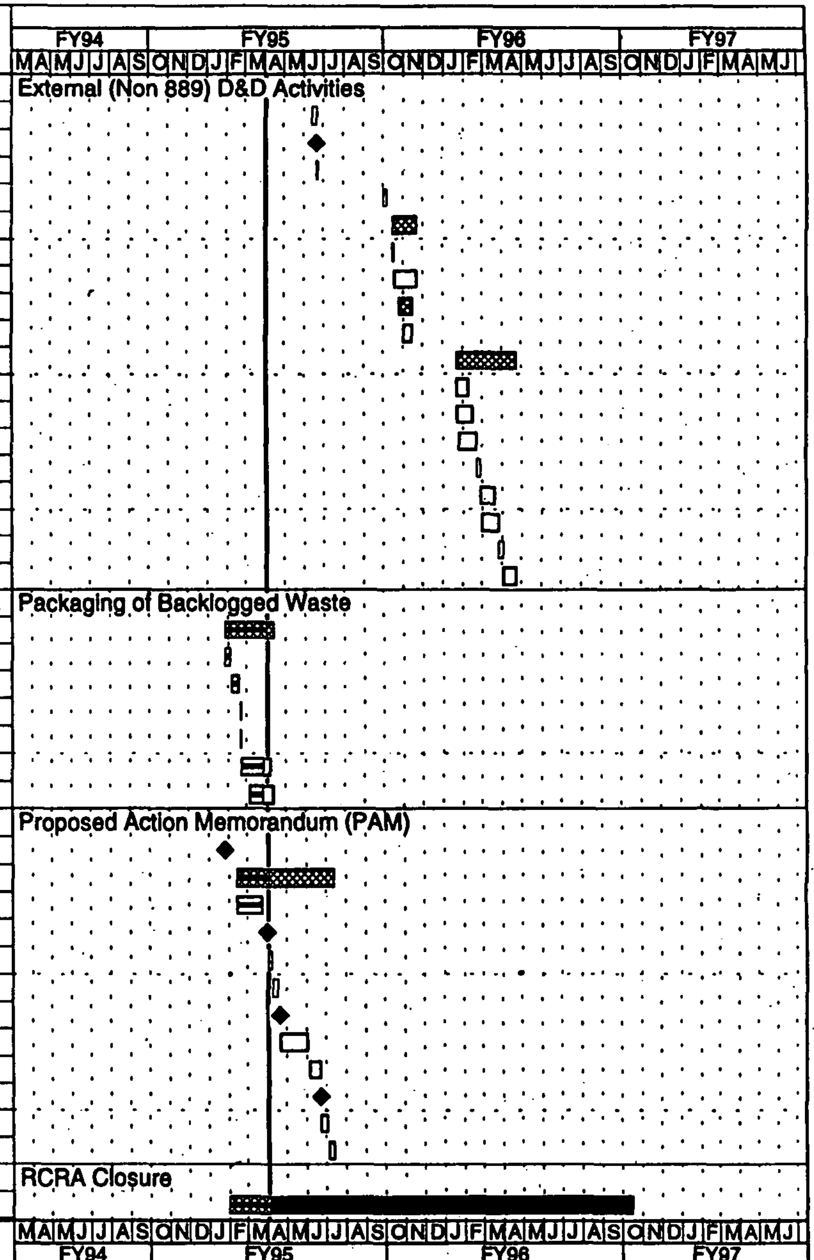
**EG&G R.F.E.T.S., Inc.**
**BLDG 889 COMPLETE DEMOLITION**
**WORK PKG 13003 LIFECYCLE SHEDULE**

WORKING SCHEDULE

| Date | Revision | Checked | Approved |
|---|---|---|---|
| | | | |

102

| ACTIVITY ID | ACTIVITY DESCRIPTION | ORIG DUR | REM DUR | EARLY START | EARLY FINISH |
|---|---|---|---|---|---|
| | **External (Non 889) D&D Activities** | | | | |
| 920 | Incorporate Comments | 5 | 5 | 14JUN95 | 20JUN95 |
| 925 | Resubmit Work Plan | 0 | 0 | | 20JUN95 |
| 930 | Review Revised Work Plan | 2 | 2 | 21JUN95 | 22JUN95 |
| 620 | Mobilize Field Crew | 5 | 5 | 2OCT95 | 6OCT95 |
| 284 | Utilities | 27 | 27 | 16OCT95 | 21NOV95 |
| 285 | Disconnect Utilities from Building | 2 | 2 | 16OCT95 | 17OCT95 |
| 287 | Remove Electrical Conduit, Water Pipes, Etc. | 25 | 25 | 18OCT95 | 21NOV95 |
| 270 | Trailer T889A Removal | 15 | 15 | 25OCT95 | 14NOV95 |
| 272 | Relocate Trailer T889A | 10 | 10 | 1NOV95 | 14NOV95 |
| 290 | Decontaminate Interior Surfaces | 68 | 68 | 22JAN96 | 23APR96 |
| 50040 | Decontamination (photos) | 15 | 15 | 22JAN96 | 9FEB96 |
| 50154 | Erect and Move Scaffolding | 19 | 19 | 22JAN96 | 15FEB96 |
| 50155 | Decontaminate Ceiling | 20 | 20 | 25JAN96 | 21FEB96 |
| 50156 | Dissassemble Scaffolding | 3 | 3 | 22FEB96 | 26FEB96 |
| 50157 | Erect and Move Scaffolding | 17 | 17 | 27FEB96 | 20MAR96 |
| 50158 | Decontaminate Walls | 19 | 19 | 29FEB96 | 26MAR96 |
| 50159 | Disassemble Scaffolding | 4 | 4 | 27MAR96 | 2APR96 |
| 50160 | Decontaminate Floor | 15 | 15 | 3APR96 | 23APR96 |
| | **Packaging of Backlogged Waste** | | | | |
| 150 | Packaging of Backlogged Waste | 54 | 8 | 27JAN95A | 12APR95 |
| 155 | Develop Integrated Work Control Package (IWCP) | 15 | 0 | 27JAN95A | 3FEB95A |
| 160 | IWCP Safety Screens | 10 | 0 | 6FEB95A | 17FEB95A |
| 165 | Mobilize Work Force | 5 | 0 | 20FEB95A | 20FEB95A |
| 170 | RCA Setup | 5 | 0 | 20FEB95A | 20FEB95A |
| 175 | Repackage backlogged waste/HEPA filter | 20 | 5 | 21FEB95A | 7APR95 |
| 180 | Ship Repackaged waste to on-site storage | 18 | 8 | 6MAR95A | 12APR95 |
| | **Proposed Action Memorandum (PAM)** | | | | |
| 395 | Baseline Change Proposal | 0 | 0 | | 26JAN95A |
| 400 | Proposed Action Memorandum (PAM) | 106 | 71 | 13FEB95A | 13JUL95 |
| 405 | Develop PAM-EG&G | 30 | 0 | 13FEB95A | 24MAR95A |
| 406 | Submit to DOE | 0 | 0 | | 31MAR95 |
| 407 | DOE Review | 5 | 5 | 3APR95 | 7APR95 |
| 408 | Incorporate DOE Comments | 5 | 5 | 10APR95 | 17APR95 |
| 410 | Issue PAM to CDH/EPA | 0 | 0 | | 20APR95 |
| 415 | Public Comment Period | 30 | 30 | 21APR95 | 2JUN95 |
| 420 | Incorp. Comments/Prepare Respons. Summ. | 14 | 14 | 5JUN95 | 22JUN95 |
| 425 | Submit Responsiveness Summary | 0 | 0 | | 22JUN95 |
| 430 | CDH/EPA Approval Period | 7 | 7 | 23JUN95 | 3JUL95 |
| 435 | Incorporate Comments | 7 | 7 | 5JUL95 | 13JUL95 |
| | **RCRA Closure** | | | | |
| 800 | RCRA Closure | 431 | 387 | 31JAN95A | 16OCT96 |




Activity Classification: Activity Type
Hammock
Milestone

Plot Date 6APR95
Data Date 3APR95
Project Start 1APR94
Project Finish 16JUN97



Activity Bar/Early Dates
Critical Activity
Progress Bar
Milestone/Flag Activity

8891

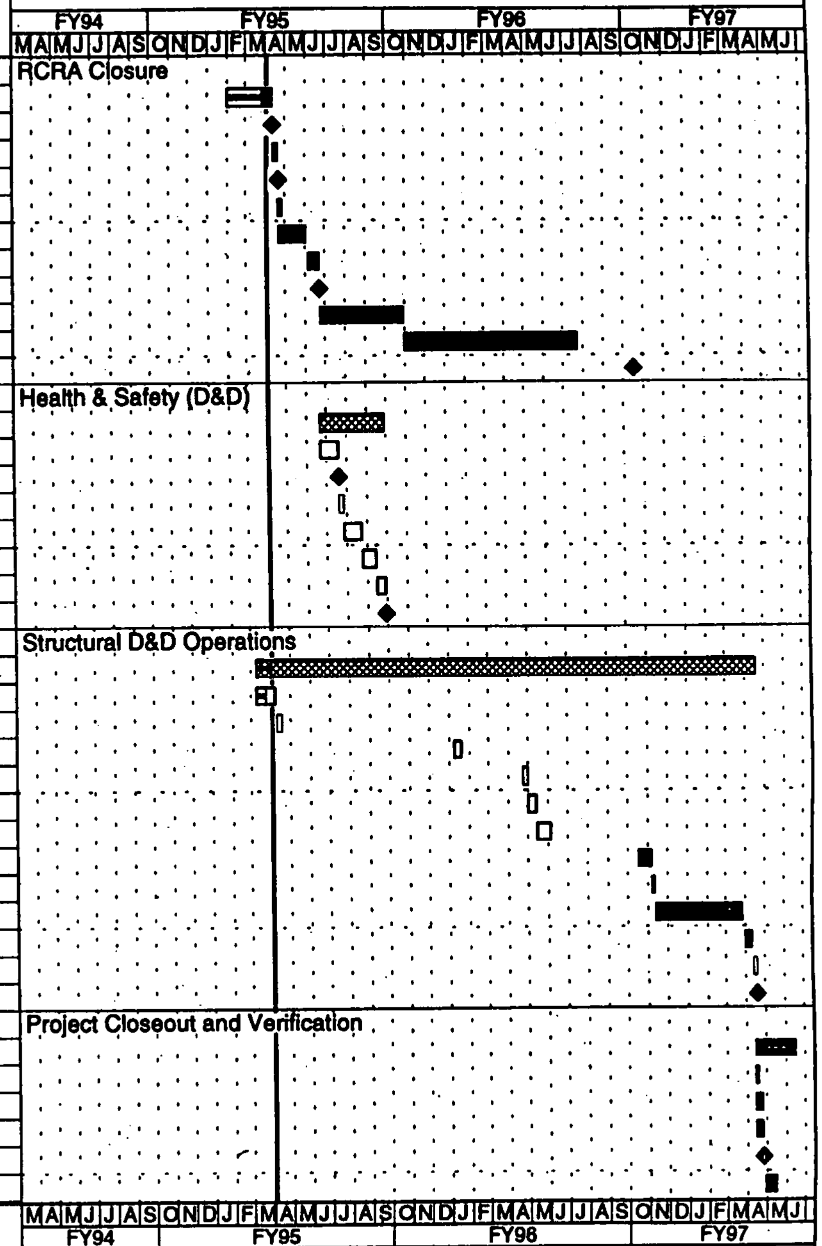
Sheet 6 of 6

**EG&G R.F.E.T.S., Inc.**
**BLDG 889 COMPLETE DEMOLITION**
**WORK PKG 13003 LIFECYCLE SHEDULE**

| WORKING SCHEDULE | | | |
|---|---|---|---|
| Date | Revision | Checked | Approved |
| | | | |

302

| ACTIVITY ID | ACTIVITY DESCRIPTION | ORIG DUR | REM DUR | EARLY START | EARLY FINISH |
|---|---|---|---|---|---|
| 805 | Develop RCRA Closure | 30 | 7 | 31JAN95A | 11APR95 |
| 411 | Submit to DOE | 0 | 0 | | 11APR95 |
| 412 | DOE Review | 5 | 5 | 12APR95 | 19APR95 |
| 810 | Issue RCRA Closure Plan to CDH/EPA | 0 | 0 | | 20APR95 |
| 413 | Incorporate DOE Comments | 5 | 5 | 20APR95 | 26APR95 |
| 815 | Public Comment Period | 30 | 30 | 21APR95 | 2JUN95 |
| 820 | Incorp. Comments/Prepare Respons. Summ. | 14 | 14 | 5JUN95 | 22JUN95 |
| 825 | Submit Responsiveness Summary | 0 | 0 | | 22JUN95 |
| 830 | CDH/EPA Approval Period | 90 | 90 | 23JUN95 | 30OCT95 |
| 561 | RCRA Closure Unit 40 | 180 | 180 | 31OCT95 | 23JUL96 |
| 562 | Closure Certification Received | 0 | 0 | | 16OCT96 |
| 700 | Health & Safety Plan (D&D) | 70 | 70 | 21JUN95 | 28SEP95 |
| 705 | Prepare Health & Safety Plan | 20 | 20 | 21JUN95 | 19JUL95 |
| 710 | Submit Health & Safety Plan to ER for Review | 0 | 0 | | 19JUL95 |
| 715 | ER Coordinates Review Cycle | 5 | 5 | 20JUL95 | 26JUL95 |
| 720 | Incorporate ER Comments | 20 | 20 | 27JUL95 | 23AUG95 |
| 725 | DOE Review Health & Safety Plan | 15 | 15 | 24AUG95 | 14SEP95 |
| 730 | Incorporate DOE Comments | 10 | 10 | 15SEP95 | 28SEP95 |
| 735 | Final Health & Safety Plan Approval | 0 | 0 | | 28SEP95 |
| 263 | Structural D&D Operations | 527 | 510 | 9MAR95A | 18APR97 |
| 118 | IWCP Development (A) - Structure Removal | 10 | 5 | 9MAR95A | 7APR95 |
| 140 | Approval Period - Structure Removal IWCP | 5 | 5 | 10APR95 | 17APR95 |
| 262 | Remove Mezzanine Structure Rm. 101 & 112 | 10 | 10 | 8JAN96 | 19JAN96 |
| 291 | Dismantle Administration Area | 5 | 5 | 24APR96 | 30APR96 |
| 292 | Dismantle Pre-Fab Area | 10 | 10 | 1MAY96 | 14MAY96 |
| 293 | Dismantle Original Structure | 15 | 15 | 15MAY96 | 5JUN96 |
| 294 | Dismantle Base Mat | 15 | 15 | 17OCT96 | 6NOV96 |
| 296 | Sample Soil Under Building | 3 | 3 | 7NOV96 | 11NOV96 |
| 297 | Laboratory Analysis | 90 | 90 | 12NOV96 | 27MAR97 |
| 295 | Remove Process Lines Under Soil | 10 | 10 | 31MAR97 | 11APR97 |
| 50041 | Project Completion (photos) | 5 | 5 | 14APR97 | 18APR97 |
| 50503 | Complete D&D Operations | 0 | 0 | | 18APR97 |
| 50167 | Project Closeout and Verification | 45 | 45 | 14APR97 | 16JUN97 |
| 50169 | Internal Verification | 5 | 5 | 14APR97 | 18APR97 |
| 50168 | Closeout Operations | 10 | 10 | 14APR97 | 25APR97 |
| 50170 | Prepare Final Report | 10 | 10 | 14APR97 | 25APR97 |
| 50171 | Submit Final Report to DOE | 0 | 0 | | 25APR97 |
| 50172 | DOE Review and Comment | 15 | 15 | 28APR97 | 16MAY97 |




Activity Classification: Activity Type
Hammock
Milestone

Plot Date 6APR95
Data Date 3APR95
Project Start 1APR94
Project Finish 16JUN97

(c) Primavera Systems, Inc.

Activity Bar/Early Dates
Critical Activity
Progress Bar
Milestone/Flag Activity

8891

Sheet 7 of 8

EG&G R.F.E.T.S., Inc.
BLDG 889 COMPLETE DEMOLITION
WORK PKG 13003 LIFECYCLE SHEDULE

WORKING SCHEDULE

| Date | Revision | Checked | Approved |
|---|---|---|---|

303

| ACTIVITY ID | ACTIVITY DESCRIPTION | ORIG DUR | REM DUR | EARLY START | EARLY FINISH |
|---|---|---|---|---|---|
| | **Project Closeout and Verification** | | | | |
| 50173 | Incorporate Comments | 5 | 5 | 19MAY97 | 23MAY97 |
| 50174 | Independent Contractor Verification | 5 | 5 | 26MAY97 | 2JUN97 |
| 50175 | Incorporate Comments | 5 | 5 | 3JUN97 | 9JUN97 |
| 50176 | ICV Submits Verification Report to DOE | 0 | 0 | | 9JUN97 |
| 50177 | DOE Review Project Closeout | 5 | 5 | 10JUN97 | 16JUN97 |
| 50178 | DOE Approve Project Closure | 0 | 0 | | 16JUN97 |

FY94 FY95 FY96 FY97

Activity Classification: Activity Type

Hammock

Milestone

| | |
|---|---|
| Plot Date | 6APR95 |
| Data Date | 3APR95 |
| Project Start | 1APR94 |
| Project Finish | 16JUN97 |

(c) Primavera Systems, Inc.

Activity Bar/Early Dates
Critical Activity
Progress Bar
Milestone/Flag Activity

8891

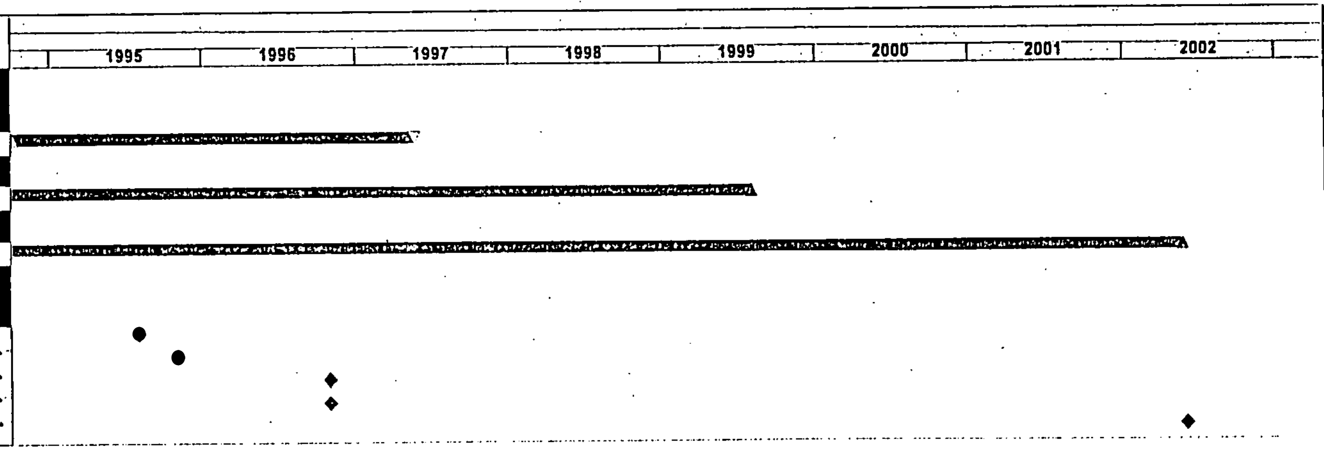
Sheet 8 of 8

EG&G R.F.E.T.S., Inc.
BLDG 889 COMPLETE DEMOLITION
WORK PKG 13003 LIFECYCLE SHEDULE

WORKING SCHEDULE

| Date | Revision | Checked | Approved |
|---|---|---|---|
| | | | |

| Activity ID | Activity Description | Early start | Early finish |
|---|---|---|---|
| | **SNM Consolidation/ Shrink the PA** | | |
| | **+ 1.0 NEAR TERM SNM REPACKAGING** | | |
| | | 03OCT94 | 21MAY97 |
| | **+ 2.0 INITIATE SNM CONSOL INTO BLDG 371** | | |
| | | | 02AUG99 |
| | **+ 3.0 LONG TERM SNM REPACKAGING** | | |
| | | | 23MAY02 |
| | **KEY MILESTONES** | | |
| | **KEY MILESTONES** | | |
| 103023001 | Prioitization for Repackaging Pu Metals w/Plasti | | 31JUL95* |
| 103023002 | Repackage All Pu Metals in Direct Contact w/ | | 30OCT95* |
| 103023003 | Thermally Stab. All Exist. Backlog Reactive Pu | | 30OCT96* |
| 103023004 | Repackage Pu Metals & Oxides w/Plastic by | | 30OCT96* |
| 103023005 | Repkg. All Pu Metals/Oxides to Metal/Oxide | | 30MAY02* |




305

| | | |
|---|---|---|
| Project Start | 01AUG94 | Early Bar |
| Project Finish | 25MAR44 | Progress Bar |
| Data Date | 01OCT94 | Critical Activity |

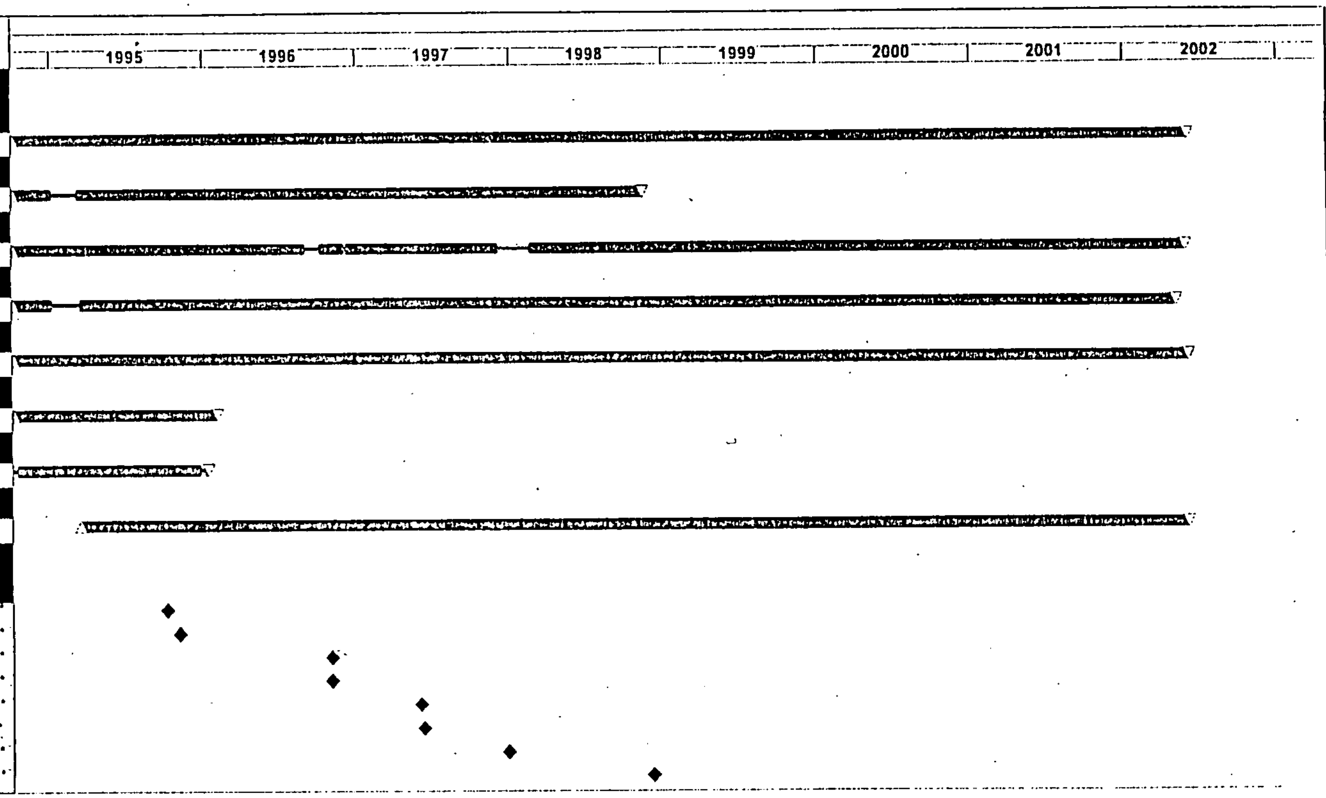
IPPB

RFETS
7MARCH95

Sheet 1 of 4

| Date | Revision | Checked | Approved |
|---|---|---|---|
| | Pre-Decisional Working Copy | | |

| Activity ID | Activity Description | Early start | Early finish |
|---|---|---|---|
| **Residue Stabilization** | | | |
| **+ 3.1 STABILIZED SALTS** | | | |
| | | 03OCT94 | 31MAY02 |
| **+ 3.2 STABILIZED COMBUSTIBLES** | | | |
| | | 03OCT94 | 11NOV98 |
| **+ 3.3 STABILIZED INORGANICS** | | | |
| | | 03OCT94 | 24MAY02 |
| **+ 3.4 STABILIZED ASH** | | | |
| | | 03OCT94 | 01MAY02 |
| **+ 3.5 STABILIZED WET AND MISCELLANEOUS RESIDUES** | | | |
| | | 03OCT94 | 31MAY02 |
| **+ 3.6 CHARACTERIZED RESIDUES** | | | |
| | | 03OCT94 | 02FEB96 |
| **+ 3.7 MITIGATED SAFETY CONCERNS** | | | |
| | | 06SEP94A | 11JAN96 |
| **+ 3.8 RESIDUE STABILIZATION PROGRAM MGT.** | | | |
| | | 14MAR95 | 31MAY02 |
| **KEY MILESTONES** | | | |
| **KEY MILESTONES** | | | |
| 306031001 | Dev.Risk/Site Categ./Prio. Crit. for Stor. Resid | | 02OCT95* |
| 307021001 | Vent 2,045 Drums W/Potential for Hydrogen | | 30OCT95* |
| 305041001 | Vent All Wet/Miscellaneous Residues | | 30OCT96* |
| 305041002 | Vent All Inorganic Residues | | 30OCT96* |
| 301041001 | Stabilize/Repkg. 6,000 kg Highrisk Pu Cont. | | 29MAY97* |
| 304041001 | Stabilize All Sand/Slag/Crucible/Graphite Fines | | 02JUN97* |
| 301041002 | Slab. Remaing.High risk Salts via Chem. | | 19DEC97* |
| 302041001 | Stabilize Higher Risk Combustibles(11,000kg) | | 30NOV98* |




306

| | | | |
|---|---|---|---|
| Project Start | 01AUG94 | Early Bar | IPPB |
| Project Finish | 25MAR44 | Progress Bar | |
| Data Date | 01OCT94 | Critical Activity | |

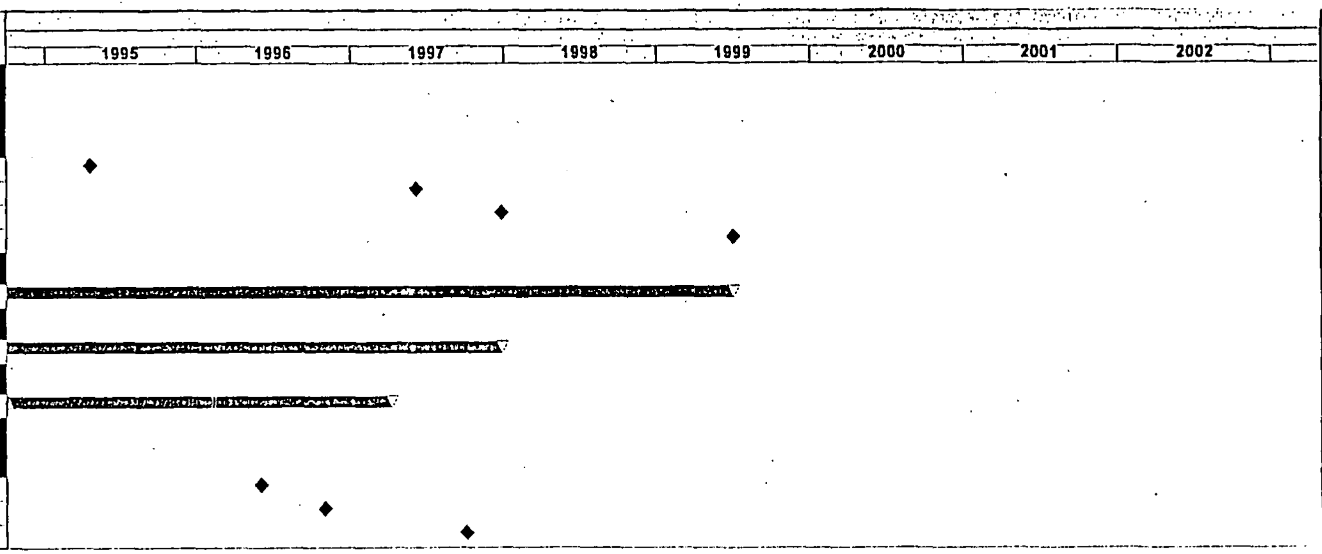
RFETS
7MARCH95

Sheet 2 of 4

Pre-Decisional Working Copy

| Date | Revision | Checked | Approved |
|---|---|---|---|

| Activity ID | Activity Description | Early start | Early finish |
|---|---|---|---|
| **Liquid Stabilization** | | | |
| **Pu SOLUTION STABILIZATION** | | | |
| **Pu SOLUTION STABILIZATION KEY MILESTONES** | | | |
| 401010103 | Complete EA FONSI -- NEPA Analysis for Liq. | | 17APR95* |
| 401010102 | Stabilize 80% High-Level & 50% Low-Level | | 02JUN97* |
| 407101001 | Stabilize All Solutions in Building 771 | | 23DEC97* |
| 403101001 | Stabilize All Solutions in Building 371 | | 30JUN99* |
| **+ 3.0 BLDG. 371 LIQUID STABILIZATION** | | | |
| | | 01OCT93A | 30JUN99 |
| **+ 7.0 BLDG. 771 LIQUID STABILIZATION** | | | |
| | | 27OCT93A | 23DEC97 |
| **+ 8.0 Highly Enriched Uranium Solutions (HEUN)** | | | |
| | | 03OCT94 | 04APR97 |
| **HEUN KEY MILESTONES** | | | |
| **KEY MILESTONES** | | | |
| 408070101 | Begin Shipping HEUN Solutions Offsite for | 31MAY96* | |
| 408070102 | Remove HEUN Solutions from Rocky Flats | | 30OCT96* |
| 408070104 | Ship Converted Oxide to Approved Storage | | 30SEP97* |




307

Project Start 01AUG94
Project Finish 25MAR44
Data Date 01OCT94

Early Bar
Progress Bar
Critical Activity

IPPB

RFETS
7MARCH95



| Date | Revision | Checked | Approved |
|---|---|---|---|

Pre-Decisional Working Copy

| Activity ID | Activity Description | Early start | Early finish | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 |
|---|---|---|---|---|---|---|---|---|---|---|---|

**Excess Materials**

**+ SNM OFFSITE SHIPMENTS**

| Activity ID | Activity Description | Early start | Early finish |
|---|---|---|---|
| 705060000 | SNM OFFSITE SHIPMENTS | 03OCT94 | 18DEC98 |

| | | | |
|---|---|---|---|
| Project Start | 01AUG94 | Early Bar | 1PPB |
| Project Finish | 25MAR44 | Progress Bar | |
| Data Date | 01OCT94 | Critical Activity | |
| Plot Date | 08MAR95 | | |

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RFETS
7MARCH95
94.1 ACTIVITIES

Pre-Decisional Working Copy

| Date | Revision | Checked | Approved |
|---|---|---|---|
| | | | |

308

| Activity ID | Activity Description | Early start | Early finish |
|---|---|---|---|
| **SNM Consolidation/ Shrink the PA** | | | |
| **1.0 NEAR TERM SNM REPACKAGING** | | | |
| **+ 1.1 BRUSH & REPACKAGE B371 ITEMS** | | | |
| | | 03OCT94 | 16APR96 |
| **+ 1.2 BRUSH & REPACKAGE 700 AREA ITEMS** | | | |
| | | 01FEB95 | 26SEP96 |
| **+ 1.3 PU STARTUP TEST PROGRAM (500° C)** | | | |
| | | 03OCT94 | 17JUL95 |
| **+ 1.4 UNRESTRICTED THERMAL STAB (800°)** | | | |
| | | 03OCT94 | 24OCT96 |
| **+ 1.5 FY96 SIZING OF LARGE ITEMS** | | | |
| | | 02OCT95 | 20MAY97 |
| **+ 1.6 SNM NEAR TERM MGMT & ADMIN** | | | |
| | | 03OCT94 | 21MAY97 |
| **2.0 INITIATE SNM CONSOL INTO BLDG 371** | | | |
| **+ 2.1 B371 PREPARATION** | | | |
| | | 03OCT94 | 29FEB96 |
| **+ 2.2 B371 INCREASE STORAGE CAPACITY** | | | |
| | | | 23NOV98 |
| **+ 2.3 EXPORT BLDG/TRANSFER PREPS** | | | |
| | | | 03JUN99 |
| **+ 2.4 EXPORT MATERIAL TRANSFER** | | | |
| | | 03OCT94 | 02AUG99 |
| **3.0 LONG TERM SNM REPACKAGING** | | | |
| **+ 3.1 LIFE CYCLE ASSESSMENT** | | | |
| 103010400 | ENVIRONMENTAL ASSESSMENT - | 03OCT94A | 20SEP95 |
| **+ 3.2 LONG TERM STORAGE** | | | |
| | | 03OCT94 | 23MAY02 |
| **+ 3.3 CAPITAL PROJECTS** | | | |
| | | 03OCT94 | 21FEB01 |
| **KEY MILESTONES** | | | |
| **KEY MILESTONES** | | | |
| 103023001 | Prioritization for Repackaging Pu Metals w/Plasti | | 31JUL95* |
| 103023002 | Repackage All Pu Metals in Direct Contact w/ | | 30OCT95* |
| 103023003 | Thermally Stab. All Exist. Backlog Reactive Pu | | 30OCT96* |
| 103023004 | Repackage Pu Metals & Oxides w/Plastic by | | 30OCT96* |
| 103023005 | Repkg. All Pu Metals/Oxides to Metal/Oxide | | 30MAY02* |

1995 1996 1997 1998 1999 2000 2001 2002

Project Start 01AUG94 Early Bar
Project Finish 25MAR44 Progress Bar
Data Date 01OCT94 Critical Activity

IPPB

RFETS
7MARCH95

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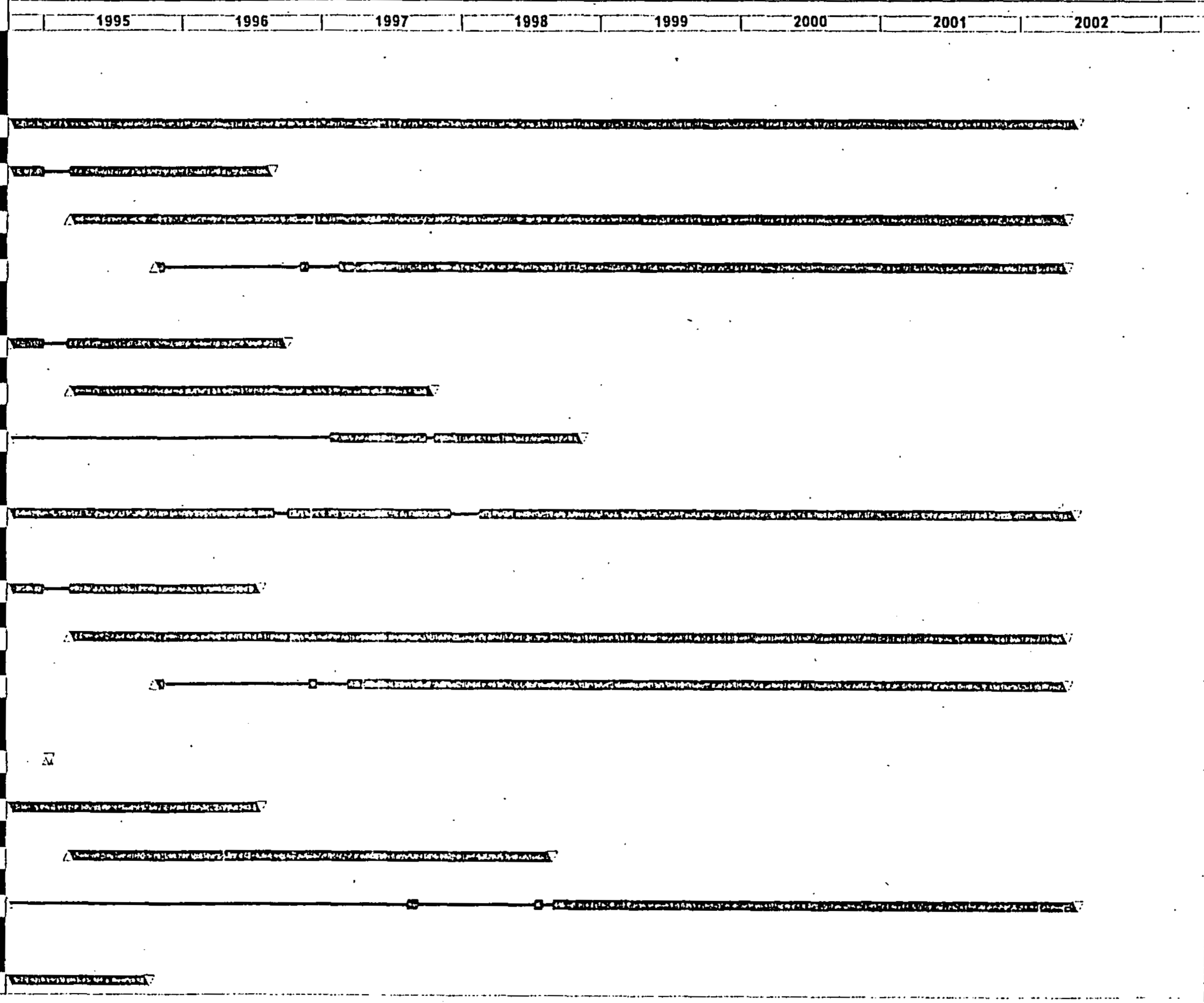
Pre-Decisional Working Copy

| Date | Revision | Checked | Approved |
|---|---|---|---|

309

| Activity ID | Activity Description | Early start | Early finish |
|---|---|---|---|
| | **Residue Stabilization** | | |
| | **3.1 STABILIZED SALTS** | | |
| | **+ 3.1.1 TRTMT PROCESS & FACILITY SELECTION** | 03OCT94 | 31MAY02 |
| | **+ 3.1.2 ACTIVITY BASED AUTHORIZATION** | 03OCT94 | 26AUG96 |
| | **+ 3.1.3 SALTS PROCESS AND FACILITY PREP** | 14MAR95 | 01MAY02 |
| | **+ 3.1.4 FACILITY OPERATION SALT** | 20OCT95 | 01MAY02 |
| | **3.2 STABILIZED COMBUSTIBLES** | | |
| | **+ 3.2.2 ACTIVITY BASED AUTHORIZATION** | 03OCT94 | 04OCT96 |
| | **+ 3.2.3 COMBUSTIBLE PROCESS & FACILITY PREP** | 14MAR95 | 17OCT97 |
| | **+ 3.2.4 FACILITY OPERATION COMBUSTIBLES** | 03OCT94 | 11NOV98 |
| | **3.3 STABILIZED INORGANICS** | | |
| | **+ 3.3.1 INORGANIC REPACK** | 03OCT94 | 24MAY02 |
| | **3.4 STABILIZED ASH** | | |
| | **+ 3.4.2 ACTIVITY BASED AUTHORIZATION** | 03OCT94 | 23JUL96 |
| | **+ 3.4.3 ASH PROCESS AND FACILITY PREP** | 14MAR95 | 01MAY02 |
| | **+ 3.4.4 FACILITY OPERATION ASH** | 20OCT95 | 01MAY02 |
| | **3.5 STABILIZED WET AND MISCELLANEOUS RESIDUES** | | |
| | **+ 3.5.1 TRTMT PROCESS & FACILITY SELECTION - WETRE** | 18JAN95 | 20JAN95 |
| | **+ 3.5.2 ACTIVITY BASED AUTHORIZATION** | 03OCT94 | 26JUL96 |
| | **+ 3.5.3 WET RES PROCESS & FACILITY PREP** | 14MAR95 | 26AUG98 |
| | **+ 3.5.4 FACILITY OPERATION WET RES** | 03OCT94 | 31MAY02 |
| | **3.6 CHARACTERIZED RESIDUES** | | |
| | **+ 3.6.1 SOLID RESIDUE CHARACTERIZATION** | 03OCT94 | 09OCT95 |




Project Start 01AUG94
Project Finish 25MAR44
Data Date 01OCT94

Early Bar
Progress Bar
Critical Activity

IPPD

RFETS
7MARCH95

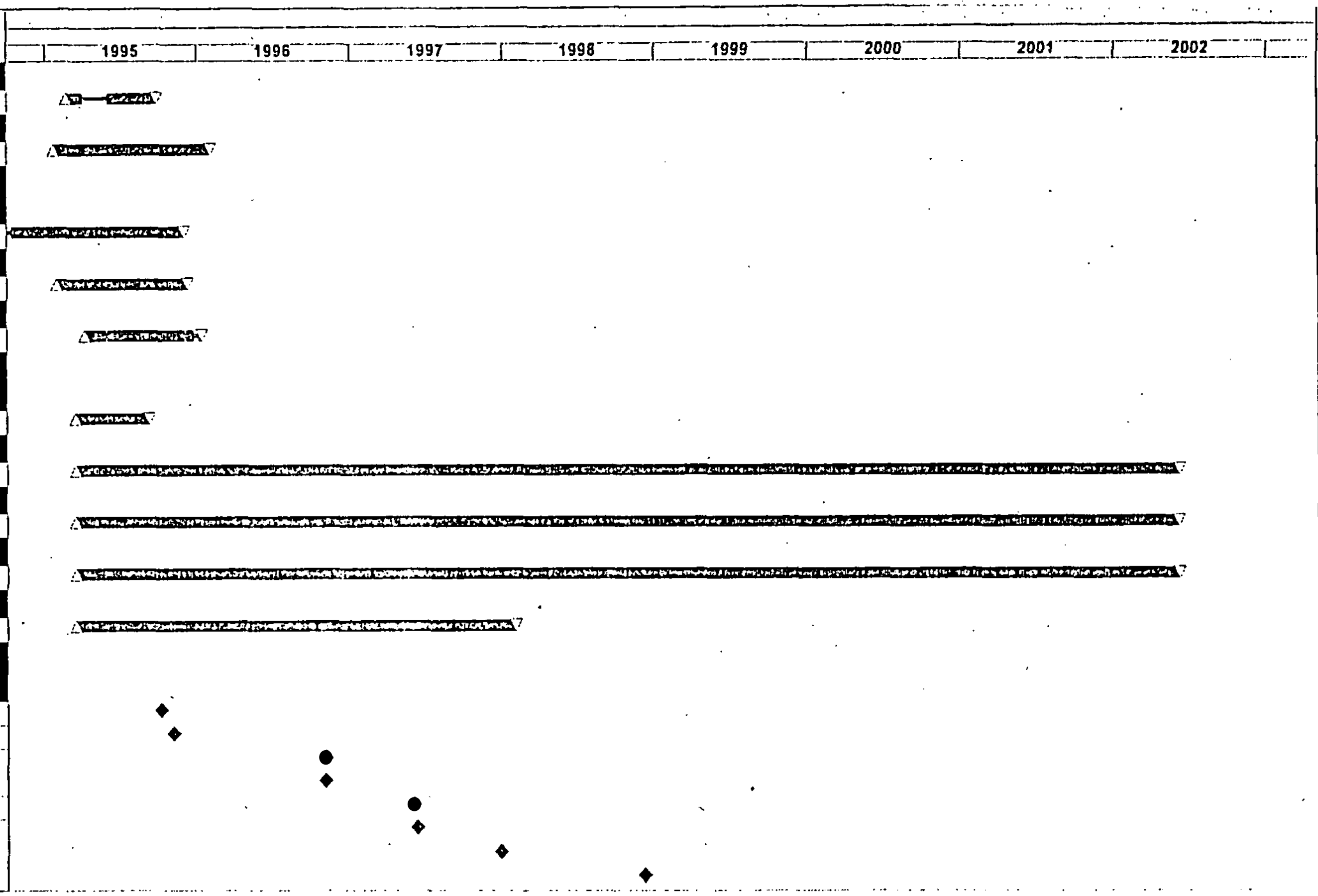
Sheet 2 of 6

| Date | Revision | Checked | Approved |
|---|---|---|---|

Pre-Decisional Working Copy

310

| Activity ID | Activity Description | Early start | Early finish |
|---|---|---|---|
| **+ 3.6.2 HEAD SPACE GAS SAMPLING** | | | |
| | | 20FEB95 | 25SEP95 |
| **+ 3.6.3 IMPLEMENT NEW TECHNOLOGIES** | | | |
| | | 20JAN95 | 02FEB96 |
| **3.7 MITIGATED SAFETY CONCERNS** | | | |
| **+ 3.7.1 ELEVATED H2 ER SALT DRUM** | | | |
| | | 06SEP94A | 01DEC95 |
| **+ 3.7.2 B371 DRUM VENTING** | | | |
| | | 27JAN95 | 07DEC95 |
| **+ 3.7.4 MITIGATION OF ANTICIPATED SAFETY CONCERNS** | | | |
| | | 03APR95 | 11JAN96 |
| **3.8 RESIDUE STABILIZATION PROGRAM MGT.** | | | |
| **+ 3.8.1 PROGRAM PLANNING** | | | |
| 308010100 | PROGRAM PLANS | 14MAR95 | 05SEP95 |
| **+ 3.8.2 PROGRAM CONTROLS** | | | |
| 308020100 | PROGRAM CONTROL | 14MAR95 | 31MAY02 |
| **+ 3.8.3 PROGRAM INTEGRATION** | | | |
| 308030100 | PROGRAM INTEGRATION | 14MAR95 | 31MAY02 |
| **+ 3.8.4 CONFIGURATION MANAGEMENT** | | | |
| 308040100 | CONFIGURATION MANAGEMENT | 14MAR95 | 31MAY02 |
| **+ 3.8.6 STAKEHOLDER INVOLVEMENT** | | | |
| 308050100 | STAKEHOLDER INVOLVEMENT | 14MAR95 | 26JAN98 |
| **KEY MILESTONES** | | | |
| **KEY MILESTONES** | | | |
| 306031001 | Dev.Risk/Site Categ./Prio. Crit. for Stor. Resid | | 02OCT95* |
| 307021001 | Vent 2,045 Drums W/Potential for Hydrogen | | 30OCT95* |
| 305041001 | Vent All Wet/Miscellaneous Residues | | 30OCT96* |
| 305041002 | Vent All Inorganic Residues | | 30OCT96* |
| 301041001 | Stabilize/Repkg. 6,000 kg Highrisk Pu Cont. | | 29MAY97* |
| 304041001 | Stabilize All Sand/Slag/Crucible/Graphite Fines | | 02JUN97* |
| 301041002 | Stab. Remaing.High risk Salts via Chem. | | 19DEC97* |
| 302041001 | Stabilize Higher Risk Combustibles(11,000kg) | | 30NOV98* |




311

| Activity ID | Activity Description | Early start | Early finish |
|---|---|---|---|
| **Liquid Stabilization** | | | |
| **Pu SOLUTION STABILIZATION** | | | |
| **Pu SOLUTION STABILIZATION KEY MILESTONES** | | | |
| 401010103 | Complete EA FONSI -- NEPA Analysis for Liq. | | 17APR95* |
| 401010102 | Stabilize 80% High-Level & 50% Low-Level | | 02JUN97* |
| 407101001 | Stabilize All Solutions in Building 771 | | 23DEC97* |
| 403101001 | Stabilize All Solutions in Building 371 | | 30JUN99* |
| **3.0 BLDG. 371 LIQUID STABILIZATION** | | | |
| **+ 3.1 B371 CAUSTIC WASTE TREATMENT SYSTEM** | | | |
| | | 01OCT93A | 30JUN99 |
| **+ 3.2 B371 TANK DRAINING** | | | |
| | | 27MAY94A | 03SEP96 |
| **+ 3.3 B371 ROOM DRAINING** | | | |
| | | 15AUG94A | 30JUN99 |
| **+ 3.9 B371 PROGRAM MANAGEMENT/OTHER** | | | |
| | | 01OCT93A | 30JUN99 |
| **7.0 BLDG. 771 LIQUID STABILIZATION** | | | |
| **+ 7.1 HYDROXIDE PRECIPITATION** | | | |
| | | 01APR94A | 07JUN96 |
| **+ 7.2 B771 OXALATE PRECIPITATION** | | | |
| | | 07MAR94A | 23DEC97 |
| **+ 7.3 B771 TANK DRAINING** | | | |
| | | 25FEB94A | 01DEC95 |
| **+ 7.4 B771 ROOM DRAINING** | | | |
| | | 17MAR94A | 26NOV97 |
| **+ 7.5 B771 RESIN REMOVAL** | | | |
| | | 13DEC93A | 30AUG95 |
| **+ 7.6 B771 CARRIER PRECIPITATION RESTART** | | | |
| | | 19SEP94A | 17AUG95 |
| **+ 7.7 PROGRAM SUPPORT** | | | |
| | | 27OCT93A | 23DEC97 |
| **8.0 Highly Enriched Uranium Solutions (HEUN)** | | | |
| **+ 8.1 Option Decision** | | | |
| | | 03OCT94 | 12APR95 |
| **+ 8.2 Buildng Readiness** | | | |
| | | 03OCT94 | 21NOV95 |
| **+ 8.4 Safety Envelope** | | | |
| | | 03OCT94 | 17OCT95 |
| **+ 8.5 Readiness Review** | | | |
| | | 22NOV95 | 08APR96 |

1995 1996 1997 1998 1999 2000 2001 2002

| | |
|---|---|
| Project Start | 01AUG94 |
| Project Finish | 25MAR44 |
| Data Date | 01OCT94 |
| Plot Date | 08MAR95 |

Early Bar
Progress Bar
Critical Activity

IPPD

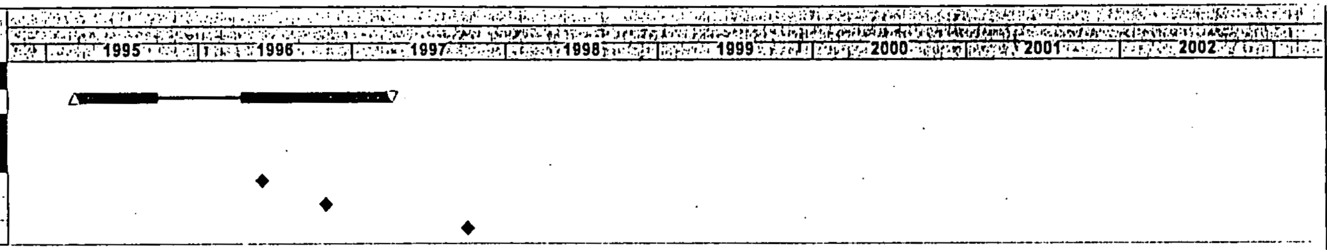
RFETS
7MARCH95

Sheet 4 of 6

| Date | Pre-Decisional Working Copy Revision | Checked | Approved |
|---|---|---|---|
| | | | |

312

| Activity ID | Activity Description | Early start | Early finish |
|---|---|---|---|
| **+ 8.6 Solution Removal** | | | |
| | | 09MAR95 | 04APR97 |
| **HEUN KEY MILESTONES** | | | |
| **KEY MILESTONES** | | | |
| 408070101 | Begin Shipping HEUN Solutions Offsite for | 31MAY96* | |
| 408070102 | Remove HEUN Solutions from Rocky Flats | | 30OCT96* |
| 408070104 | Ship Converted Oxide to Approved Storage | | 30SEP97* |




| | | |
|---|---|---|
| Project Start | 01AUG94 | Early Bar |
| Project Finish | 25MAR44 | Progress Bar |
| Data Date | 01OCT94 | Critical Activity |

IPPB

RFETS
7MARCH95



Pre-Decisional Working Copy

| Date | Revision | Checked | Approved |
|---|---|---|---|

| Activity ID | Activity Description | Early start | Early finish | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Excess Materials** | | | | | | | | | | | |
| **SNM OFFSITE SHIPMENTS** | | | | | | | | | | | |
| **+ SNM Offsite Shipments** | | | | | | | | | | | |
| 705060000 | SNM OFFSITE SHIPMENTS | 03OCT94 | 18DEC98 | | | | | | | | |

RFETS

REPORT DATE 07MAR95 RUN NO. 439
14:37

Total Cost - Lvl 1 - SNM Consolidation

PRIMAVERA PROJECT PLANNER

COST LOADING REPORT

TOTAL USAGE FOR YEAR

INTEGRATED SITE SCHEDULE

START DATE 01AUG94 FIN DATE 25MAR44

DATA DATE 01OCT94 PAGE NO. 1

| ACT ID | DESC | FY 1995 | FY 1996 | FY 1997 | FY 1998 | FY 1999 | FY 2000 | FY 2001 | FY 2002 | FY 2003 | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| C - NONLABOR | | | | | | | | | | | |
| 102 | 2.0 INITIATE SNM CONSOL INTO BLDG 371 | 125 | | | | | | | | | 125 |
| 103 | 3.0 LONG TERM SNM REPACKAGING | 9974350 | 8102742 | 14520207 | 27725428 | 21927368 | 7099578 | 1725862 | 49464 | | 91125000 |
| TOTAL | C | 9974475 | 8102742 | 14520207 | 27725428 | 21927368 | 7099578 | 1725862 | 49464 | | 91125128 |
| E - NLABEXPS | | | | | | | | | | | |
| 101 | 1.0 NEAR TERM SNM REPACKAGING | 354368 | 259133 | 124899 | | | | | | | 738400 |
| 102 | 2.0 INITIATE SNM CONSOL INTO BLDG 371 | 81953 | 47352 | 69016 | 95143 | 14236 | | | | | 307700 |
| 103 | 3.0 LONG TERM SNM REPACKAGING | 31577 | 164194 | 184959 | 1261385 | 2095303 | 2557503 | 2547232 | 1622848 | | 10465000 |
| TOTAL | E | 467898 | 470679 | 378874 | 1356529 | 2109539 | 2557503 | 2547232 | 1622848 | | 11511100 |
| L - LABOR | | | | | | | | | | | |
| 101 | 1.0 NEAR TERM SNM REPACKAGING | 4541716 | 11975286 | 2915974 | | | | | | | 19432976 |
| 102 | 2.0 INITIATE SNM CONSOL INTO BLDG 371 | 1919733 | 988890 | 4677868 | 6137067 | 2193255 | | | | | 15916813 |
| 103 | 3.0 LONG TERM SNM REPACKAGING | 1922478 | 2238928 | 4991403 | 14790648 | 20099966 | 21199756 | 19841358 | 12425760 | | 97510296 |
| TOTAL | L | 8383927 | 15203104 | 12585245 | 20927714 | 22293220 | 21199756 | 19841358 | 12425760 | | 132860088 |
| | REPORT TOTAL | 18826300 | 23776524 | 27484326 | 50009672 | 46330128 | 30856836 | 24114450 | 14098072 | | 235496304 |

*NOTE: Inconsistencies in cost exist between Volume I & Volume II. Refinements in cost estimates are underway and inconsistencies between volumes will be addressed in the next revision.*

RFETS

REPORT DATE 08MAR95 RUN NO. 457
09:38

PRIMAVERA PROJECT PLANNER

COST LOADING REPORT

INTEGRATED SITE SCHEDULE

START DATE 01AUG94 FIN DATE 25MAR44

DATA DATE 01OCT94 PAGE NO. 1

Total Cost - Lvl 1 - Residue Stabilization

TOTAL USAGE FOR YEAR

| ACT ID | DESC | FY 1995 | FY 1996 | FY 1997 | FY 1998 | FY 1999 | FY 2000 | FY 2001 | FY 2002 | FY 2003 | FY 2004 | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C - NONLABOR | | | | | | | | | | | | |
| 301 | 3.1 STABILIZED SALTS | | 13275894 | 4687018 | | | | | | | | 17962912 |
| 302 | 3.2 STABILIZED COMBUSTIBLES | | 1367273 | 15234850 | | | | | | | | 16602122 |
| 304 | 3.4 STABILIZED ASH | | 11561132 | 6401781 | | | | | | | | 17962912 |
| 305 | 3.5 STABILIZED WET AND MISCELLANEOUS RESIDUES | | 510990 | 2637806 | 4801150 | | | | | | | 7949945 |
| 306 | 3.6 CHARACTERIZED RESIDUES | 786667 | 413333 | | | | | | | | | 1200000 |
| TOTAL | C | 786667 | 27128622 | 28961454 | 4801150 | | | | | | | 61677892 |
| E - NLABEXPS | | | | | | | | | | | | |
| 301 | 3.1 STABILIZED SALTS | 543383 | 436258 | 788441 | 1032093 | 848980 | 1036255 | 1032093 | 639516 | | | 6357020 |
| 302 | 3.2 STABILIZED COMBUSTIBLES | 163020 | | 1926000 | 1744681 | 255319 | | | | | | 4089020 |
| 304 | 3.4 STABILIZED ASH | 143020 | 312500 | 850746 | 1850746 | 1522388 | 1858209 | 1850746 | 1067164 | | | 9455520 |
| 305 | 3.5 STABILIZED WET AND MISCELLANEOUS RESIDUES | 155520 | | 70886 | 89114 | 1966860 | 2461047 | 2451163 | 1620930 | | | 8815520 |
| 308 | 3.8 RESIDUE STABILIZATION PROGRAM MGT. | 64000 | 113829 | 113371 | 113371 | 93257 | 113829 | 113371 | 74971 | | | 800000 |
| TOTAL | E | 1068943 | 862587 | 3749445 | 4830006 | 4686805 | 5469339 | 5447374 | 3402582 | | | 29517080 |
| L - LABOR | | | | | | | | | | | | |
| 301 | 3.1 STABILIZED SALTS | 2519103 | 4415830 | 4643105 | 6778305 | 5575703 | 6805637 | 6778305 | 3911271 | | | 41427256 |
| 302 | 3.2 STABILIZED COMBUSTIBLES | 2803963 | 1287102 | 3258593 | 6217563 | 837274 | | | | | | 14404495 |
| 303 | 3.3 STABILIZED INORGANICS | 2601166 | 2411607 | 2581926 | 2611155 | 2305888 | 2640140 | 2496677 | 1837725 | | | 19486282 |
| 304 | 3.4 STABILIZED ASH | 2640692 | 3917690 | 4840547 | 7916951 | 6512331 | 7948874 | 7916951 | 4565016 | | | 46259052 |
| 305 | 3.5 STABILIZED WET AND MISCELLANEOUS RESIDUES | 2452542 | 1242977 | 846853 | 1681158 | 11938327 | 14826981 | 14767435 | 9765562 | | | 57521836 |
| 306 | 3.6 CHARACTERIZED RESIDUES | 2634664 | 13333 | | | | | | | | | 2647998 |
| 307 | 3.7 MITIGATED SAFETY CONCERNS | 1728577 | 319917 | | | | | | | | | 2048494 |
| 308 | 3.8 RESIDUE STABILIZATION PROGRAM MGT. | 1535101 | 1302984 | 1297751 | 1187416 | 937399 | 1144178 | 1139583 | 753595 | | | 9298005 |
| TOTAL | L | 18915808 | 14911441 | 17468774 | 26392548 | 28106922 | 33365812 | 33098952 | 20833168 | | | 193093424 |
| | REPORT TOTAL | 20771418 | 42902648 | 50179672 | 36023704 | 32793726 | 38835152 | 38546328 | 24235752 | | | 284288384 |

RFETS

PRIMAVERA PROJECT PLANNER

INTEGRATED SITE SCHEDULE

REPORT DATE 07MAR95 RUN NO. 441
14:39

COST LOADING REPORT

START DATE 01AUG94. FIN DATE 25MAR44

Total Cost - Lvl 1 - Liquid Stabilization

TOTAL USAGE FOR YEAR

DATA DATE 01OCT94 PAGE NO. 1

| ACT ID | DESC | FY 1995 | FY 1996 | FY 1997 | FY 1998 | FY 1999 | FY 2000 | FY 2001 | FY 2002 | FY 2003 | FY 2004 | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C - NONLABOR | | | | | | | | | | | | |
| 408 | 8.0 Highly Enriched Uranium Solutions (HEUN) | 225000 | | | | | | | | | | 225000 |
| TOTAL | C | 225000 | | | | | | | | | | 225000 |
| E - NLABEXPS | | | | | | | | | | | | |
| 403 | 3.0 BLDG. 371 LIQUID STABILIZATION | 1248280 | 1167904 | 931174 | 978710 | 485134 | | | | | | 4811203 |
| 407 | 7.0 BLDG. 771 LIQUID STABILIZATION | 2292996 | 1243658 | 1117465 | 261319 | | | | | | | 4915438 |
| 408 | 8.0 Highly Enriched Uranium Solutions (HEUN) | 1673442 | 6009505 | 7918728 | | | | | | | | 15601674 |
| TOTAL | E | 5214719 | 8421068 | 9967366 | 1240029 | 485134 | | | | | | 25328314 |
| L - LABOR | | | | | | | | | | | | |
| 403 | 3.0 BLDG. 371 LIQUID STABILIZATION | 5658879 | 7095849 | 8410884 | 7078114 | 2332459 | | | | | | 30576184 |
| 407 | 7.0 BLDG. 771 LIQUID STABILIZATION | 15851240 | 14647511 | 11812387 | 2127532 | | | | | | | 44438668 |
| 408 | 8.0 Highly Enriched Uranium Solutions (HEUN) | 2791822 | 739276 | 377037 | | | | | | | | 3908135 |
| TOTAL | L | 24301940 | 22482636 | 20600306 | 9205646 | 2332459 | | | | | | 78922992 |
| | REPORT TOTAL | 29741658 | 30903704 | 30567672 | 10445675 | 2817593 | | | | | | 104476304 |

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RFETS PRIMAVERA PROJECT PLANNER INTEGRATED SITE SCHEDULE

REPORT DATE 07MAR95 RUN NO. 439 COST LOADING REPORT START DATE 01AUG94 FIN DATE 25MAR44
17:28

Total Cost - Lvl 1 - Excess Material TOTAL USAGE FOR YEAR DATA DATE 01OCT94 PAGE NO. 1

| ACT ID | DESC | FY 1995 | FY 1996 | FY 1997 | FY 1998 | FY 1999 | FY 2000 | FY 2001 | FY 2002 | FY 2003 | FY 2004 | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| E - NLABEXPS | | | | | | | | | | | | |
| 705 | SNM OFFSITE SHIPMENTS | 1179561 | 1189112 | 1184336 | 1184336 | 262655 | | | | | | 5000000 |
| TOTAL | E | 1179561 | 1189112 | 1184336 | 1184336 | 262655 | | | | | | 5000000 |
| | REPORT TOTAL | 1179561 | 1189112 | 1184336 | 1184336 | 262655 | | | | | | 5000000 |

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RFETS

REPORT DATE 07MAR95 RUN NO. 435
14:35

Total Cost - Lvl 2 - SNM Consolidation

PRIMAVERA PROJECT PLANNER

COST LOADING REPORT

TOTAL USAGE FOR YEAR

INTEGRATED SITE SCHEDULE

START DATE 01AUG94 FIN DATE 25MAR44

DATA DATE 01OCT94 PAGE NO. 1

| ACT ID | DESC | FY 1995 | FY 1996 | FY 1997 | FY 1998 | FY 1999 | FY 2000 | FY 2001 | FY 2002 | FY 2003 | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| C - NONLABOR | | | | | | | | | | | |
| 10201 | 2.1 B371 PREPARATION | 125 | | | | | | | | | 125 |
| 10302 | 3.2 LONG TERM STORAG | | 4222223 | 5722818 | 512009 | 201814 | 246331 | 245342 | 49464 | | 11200000 |
| 10303 | 3.3 CAPITAL PROJECTS | 9974350 | 3880519 | 8797389 | 27213420 | 21725556 | 6853247 | 1480519 | | | 79925000 |
| TOTAL | C | 9974475 | 8102742 | 14520207 | 27725428 | 21927368 | 7099578 | 1725862 | 49464 | | 91125128 |
| E - NLABEXPS | | | | | | | | | | | |
| 10101 | 1.1 BRUSH & REPACKAG | 16000 | | | | | | | | | 16000 |
| 10102 | 1.2 BRUSH & REPACKA | 321 | 39679 | | | | | | | | 40000 |
| 10103 | 1.3 PU STARTUP TEST | 150000 | | | | | | | | | 150000 |
| 10104 | 1.4 UNRESTRICTED THE | 17832 | 18782 | 786 | | | | | | | 37400 |
| 10105 | 1.5 FY96 SIZING OF L | | 29080 | 15920 | | | | | | | 45000 |
| 10106 | 1.6 SNM NEAR TERM MG | 170214 | 171593 | 108193 | | | | | | | 450000 |
| 10201 | 2.1 B371 PREPARATION | 35058 | 142 | | | | | | | | 35200 |
| 10203 | 2.3 EXPORT BLDG/TRAN | 46895 | 43210 | 67327 | 75979 | 6589 | | | | | 240000 |
| 10204 | 2.4 EXPORT MATERIAL | | 4000 | 1689 | 19164 | 7647 | | | | | 32500 |
| 10301 | 3.1 LIFE CYCLE ASSES | 5000 | | | | | | | | | 5000 |
| 10302 | 3.2 LONG TERM STORAG | 26577 | 164194 | 184959 | 1261385 | 2095303 | 2557503 | 2547232 | 1622848 | | 10460000 |
| TOTAL | E | 467898 | 470679 | 378874 | 1356529 | 2109539 | 2557503 | 2547232 | 1622848 | | 11511100 |
| L - LABOR | | | | | | | | | | | |
| 10101 | 1.1 BRUSH & REPACKAG | 2164543 | 3384180 | | | | | | | | 5548723 |
| 10102 | 1.2 BRUSH & REPACKA | 701696 | 3011672 | | | | | | | | 3713368 |
| 10103 | 1.3 PU STARTUP TEST | 665192 | | | | | | | | | 665192 |
| 10104 | 1.4 UNRESTRICTED THE | 135210 | 302357 | 19533 | | | | | | | 457100 |
| 10105 | 1.5 FY96 SIZING OF L | | 4394916 | 2340220 | | | | | | | 6735136 |
| 10106 | 1.6 SNM NEAR TERM MG | 875075 | 882160 | 556222 | | | | | | | 2313457 |
| 10201 | 2.1 B371 PREPARATION | 759482 | 2163 | | | | | | | | 761645 |
| 10202 | 2.2 B371 INCREASE ST | 161598 | 350645 | 379867 | 267415 | 17509 | | | | | 1177033 |
| 10203 | 2.3 EXPORT BLDG/TRAN | 766607 | 401534 | 3924633 | 3725403 | 43079 | | | | | 8861256 |
| 10204 | 2.4 EXPORT MATERIAL | 232046 | 234549 | 373368 | 2144249 | 2132668 | | | | | 5116880 |
| 10301 | 3.1 LIFE CYCLE ASSES | 192600 | | | | | | | | | 192600 |
| 10302 | 3.2 LONG TERM STORAG | 387376 | 1375809 | 3161043 | 9764972 | 16050239 | 19590732 | 19512054 | 12425760 | | 82267984 |
| 10303 | 3.3 CAPITAL PROJECTS | 1342502 | 863120 | 1830360 | 5025676 | 4049726 | 1609025 | 329303 | | | 15049711 |
| TOTAL | L | 8383927 | 15203104 | 12585245 | 20927714 | 22293220 | 21199758 | 19841358 | 12425760 | | 132860088 |
| | REPORT TOTAL | 18826300 | 23776524 | 27484326 | 50009672 | 46330128 | 30856838 | 24114450 | 14098072 | | 235496304 |

JE

RFETS

PRIMAVERA PROJECT PLANNER

INTEGRATED SITE SCHEDULE

REPORT DATE 08MAR95 RUN NO. 456
09:35

COST LOADING REPORT

START DATE 01AUG94 FIN DATE 25MAR44

DATA DATE 01OCT94 PAGE NO. 1

Total Cost - Lvl 2 - Residue Stabilization

TOTAL USAGE FOR YEAR

| ACT ID | DESC | FY 1995 | FY 1996 | FY 1997 | FY 1998 | FY 1999 | FY 2000 | FY 2001 | FY 2002 | FY 2003 | FY 2004 | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C - NONLABOR | | | | | | | | | | | | |
| 30103 | 3.1.3 SALTS PROCESS AND FACILITY PREP | | 13275894 | 4687018 | | | | | | | | 17962912 |
| 30203 | 3.2.3 COMBUSTIBLE PROCESS & FACILITY PREP | | 1367273 | 15234850 | | | | | | | | 16602122 |
| 30403 | 3.4.3 ASH PROCESS AND FACILITY PREP | | 11561132 | 6401781 | | | | | | | | 17962912 |
| 30503 | 3.5.3 WET RES PROCESS & FACILITY PREP | | 510990 | 2637806 | 4801150 | | | | | | | 7949945 |
| 30603 | 3.6.3 IMPLEMENT NEW TECHNOLOGIES | 786667 | 413333 | | | | | | | | | 1200000 |
| TOTAL | C | 786667 | 27128622 | 28961454 | 4801150 | | | | | | | 61677892 |
| E - NLABEXPS | | | | | | | | | | | | |
| 30101 | 3.1.1 TRTMT PROCESS & FACILITY SELECTION | 400363 | 123758 | 524313 | 524313 | 431290 | 526427 | 524313 | 346723 | | | 3401500 |
| 30102 | 3.1.2 ACTIVITY BASED AUTHORIZATION | 143020 | 12500 | | | | | | | | | 155520 |
| 30103 | 3.1.3 SALTS PROCESS AND FACILITY PREP | | 300000 | | | | | | | | | 300000 |
| 30104 | 3.1.4 FACILITY OPERATION SALT | | | 264128 | 507781 | 417690 | 509828 | 507781 | 292793 | | | 2500000 |
| 30202 | 3.2.2 ACTIVITY BASED AUTHORIZATION | 163020 | | | | | | | | | | 163020 |
| 30203 | 3.2.3 COMBUSTIBLE PROCESS & FACILITY PREP | | | 1926000 | | | | | | | | 1926000 |
| 30204 | 3.2.4 FACILITY OPERATION COMBUSTIBLES | | | | 1744681 | 255319 | | | | | | 2000000 |
| 30402 | 3.4.2 ACTIVITY BASED AUTHORIZATION | 143020 | 12500 | | | | | | | | | 155520 |
| 30403 | 3.4.3 ASH PROCESS AND FACILITY PREP | | 300000 | | | | | | | | | 300000 |
| 30404 | 3.4.4 FACILITY OPERATION ASH | | | 850746 | 1850746 | 1522388 | 1858209 | 1850746 | 1067164 | | | 9000000 |
| 30502 | 3.5.2 ACTIVITY BASED AUTHORIZATION | 155520 | | | | | | | | | | 155520 |
| 30503 | 3.5.3 WET RES PROCESS & FACILITY PREP | | | 70886 | 89114 | | | | | | | 160000 |
| 30504 | 3.5.4 FACILITY OPERATION WET RES | | | | | 1966860 | 2461047 | 2451163 | 1620930 | | | 8500000 |
| 30802 | 3.8.2 PROGRAM CONTROLS | 64000 | 113829 | 113371 | 113371 | 93257 | 113829 | 113371 | 74971 | | | 800000 |
| TOTAL | E | 1068943 | 862587 | 3749445 | 4830006 | 4686805 | 5469339 | 5447374 | 3402582 | | | 29517080 |
| L - LABOR | | | | | | | | | | | | |
| 30101 | 3.1.1 TRTMT PROCESS & FACILITY SELECTION | 195684 | 202365 | 33222 | 33222 | 27327 | 33356 | 33222 | 21969 | | | 580366 |
| 30102 | 3.1.2 ACTIVITY BASED AUTHORIZATION | 1749747 | 954937 | | | | | | | | | 2704684 |
| 30103 | 3.1.3 SALTS PROCESS AND FACILITY PREP | 573672 | 3246688 | 579352 | | | | | | | | 4399711 |
| 30104 | 3.1.4 FACILITY OPERATION SALT | | 11840 | 4030532 | 6745084 | 5548376 | 6772282 | 6745084 | 3889302 | | | 33742496 |
| 30202 | 3.2.2 ACTIVITY BASED AUTHORIZATION | 2171422 | 786724 | 2080 | | | | | | | | 2960226 |
| 30203 | 3.2.3 COMBUSTIBLE PROCESS & FACILITY PREP | 632541 | 500378 | 2316605 | 214500 | | | | | | | 3664025 |
| 30204 | 3.2.4 FACILITY OPERATION COMBUSTIBLES | | | 939908 | 6003063 | 837274 | | | | | | 7780245 |
| 30301 | 3.3.1 INORGANIC REPACK | 2601166 | 2411607 | 2581926 | 2611155 | 2305888 | 2640140 | 2496677 | 1837725 | | | 19486282 |
| 30402 | 3.4.2 ACTIVITY BASED AUTHORIZATION | 2067021 | 757775 | | | | | | | | | 2824796 |
| 30403 | 3.4.3 ASH PROCESS AND FACILITY PREP | 573672 | 3148075 | 679303 | | | | | | | | 4401050 |
| 30404 | 3.4.4 FACILITY OPERATION ASH | | 11840 | 4161244 | 7916951 | 6512331 | 7948874 | 7916951 | 4565016 | | | 39033208 |
| 30502 | 3.5.2 ACTIVITY BASED AUTHORIZATION | 2097302 | 729846 | | | | | | | | | 2827148 |
| 30503 | 3.5.3 WET RES PROCESS & FACILITY PREP | 355240 | 513132 | 834853 | 1246631 | | | | | | | 2949855 |
| 30504 | 3.5.4 FACILITY OPERATION WET RES | | | 12000 | 434528 | 11938327 | 14826981 | 14767435 | 9765562 | | | 51744832 |
| 30601 | 3.6.1 SOLID RESIDUE CHARACTERIZATION | 2183911 | 8198 | | | | | | | | | 2192109 |
| 30602 | 3.6.2 HEAD SPACE GAS SAMPLING | 339779 | | | | | | | | | | 339779 |
| 30603 | 3.6.3 IMPLEMENT NEW TECHNOLOGIES | 110975 | 5136 | | | | | | | | | 116111 |
| 30701 | 3.7.1 ELEVATED H2 ER SALT DRUM | 362792 | 314 | | | | | | | | | 363106 |
| 30702 | 3.7.2 B371 DRUM VENTING | 1186011 | 296303 | | | | | | | | | 1482314 |
| 30704 | 3.7.4 MITIGATION OF ANTICIPATED SAFETY CONCERNS | 179774 | 23300 | | | | | | | | | 203073 |
| 30801 | 3.8.1 PROGRAM PLANNING | 802500 | | | | | | | | | | 802500 |
| 30802 | 3.8.2 PROGRAM CONTROLS | 343100 | 610228 | 607777 | 607777 | 499946 | 610228 | 607777 | 401917 | | | 4288752 |
| 30803 | 3.8.3 PROGRAM INTEGRATION | 214438 | 381393 | 379861 | 379861 | 312466 | 381393 | 379861 | 251198 | | | 2680470 |
| 30804 | 3.8.4 CONFIGURATION MANAGEMENT | 85775 | 152557 | 151944 | 151944 | 124986 | 152557 | 151944 | 100479 | | | 1072188 |
| 30805 | 3.8.5 STAKEHOLDER INVOLVEMENT | 89288 | 158806 | 158168 | 47833 | | | | | | | 454096 |
| TOTAL | L | 18915808 | 14911440 | 17468774 | 26392548 | 28106922 | 33365812 | 33098952 | 20833168 | | | 193093424 |
| | REPORT TOTAL | 20771418 | 42902648 | 50179676 | 36023704 | 32793726 | 38835152 | 38546328 | 24235752 | | | 284288384 |

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RFETS PRIMAVERA PROJECT PLANNER INTEGRATED SITE SCHEDULE

REPORT DATE 07MAR95 RUN NO. 437 COST LOADING REPORT START DATE 01AUG94 FIN DATE 25MAR44
14:36 DATA DATE 01OCT94 PAGE NO. 1

Total Cost - Lvl 2 - Liquid Stabilization TOTAL USAGE FOR YEAR

| ACT ID | DESC | FY 1995 | FY 1996 | FY 1997 | FY 1998 | FY 1999 | FY 2000 | FY 2001 | FY 2002 | FY 2003 | FY 2004 | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C - NONLABOR | | | | | | | | | | | | |
| 40802 | 8.2 Buildng Readiness | 225000 | | | | | | | | | | 225000 |
| TOTAL | C | 225000 | | | | | | | | | | 225000 |
| E - NLABEXPS | | | | | | | | | | | | |
| 40301 | 3.1 B371 CAUSTIC WASTE TREATMENT SYSTEM | 334747 | 36806 | | | | | | | | | 371553 |
| 40302 | 3.2 B371 TANK DRAINING | 38091 | 256964 | | | | | | | | | 295055 |
| 40303 | 3.3 B371 ROOM DRAINING | 288738 | 302277 | 361613 | 409149 | 163607 | | | | | | 1525384 |
| 40309 | 3.9 B371 PROGRAM MANAGEMENT/OTHER | 586704 | 571858 | 569561 | 569561 | 321526 | | | | | | 2619210 |
| 40701 | 7.1 HYDROXIDE PRECIPITATION | 486422 | 118985 | | | | | | | | | 605407 |
| 40703 | 7.3 B771 TANK DRAINING | 435269 | | | | | | | | | | 435269 |
| 40704 | 7.4 B771 ROOM DRAINING | 2782 | 2805 | 101 | | | | | | | | 5688 |
| 40705 | 7.5 B771 RESIN REMOVAL | 22660 | | | | | | | | | | 22660 |
| 40707 | 7.7 PROGRAM SUPPORT | 1345863 | 1121869 | 1117363 | 261319 | | | | | | | 3846414 |
| 40801 | 8.1 Option Decision | 9000 | | | | | | | | | | 9000 |
| 40802 | 8.2 Buildng Readiness | 1205405 | 206217 | | | | | | | | | 1411622 |
| 40804 | 8.4 Safety Envelope | 459037 | 28436 | | | | | | | | | 487473 |
| 40805 | 8.5 Readiness Review | | 305904 | | | | | | | | | 305904 |
| 40806 | 8.6 Solution Removal | | 5468948 | 7918728 | | | | | | | | 13387675 |
| TOTAL | E | 5214719 | 8421068 | 9967366 | 1240029 | 485134 | | | | | | 25328314 |
| L - LABOR | | | | | | | | | | | | |
| 40301 | 3.1 B371 CAUSTIC WASTE TREATMENT SYSTEM | 1409780 | 324714 | | | | | | | | | 1734495 |
| 40302 | 3.2 B371 TANK DRAINING | 149940 | 790054 | | | | | | | | | 939994 |
| 40303 | 3.3 B371 ROOM DRAINING | 1663787 | 3681290 | 6194656 | 4863046 | 1082017 | | | | | | 17484794 |
| 40309 | 3.9 B371 PROGRAM MANAGEMENT/OTHER | 2435370 | 2299790 | 2216228 | 2215069 | 1250442 | | | | | | 10416898 |
| 40701 | 7.1 HYDROXIDE PRECIPITATION | 1931464 | 334616 | | | | | | | | | 2266080 |
| 40702 | 7.2 B771 OXALATE PRECIPITATION | 698933 | 1494754 | 1999802 | 438135 | | | | | | | 4631624 |
| 40703 | 7.3 B771 TANK DRAINING | 2611076 | 138507 | | | | | | | | | 2749584 |
| 40704 | 7.4 B771 ROOM DRAINING | 2648915 | 6104662 | 3264015 | 157877 | | | | | | | 12175468 |
| 40705 | 7.5 B771 RESIN REMOVAL | 547604 | | | | | | | | | | 547604 |
| 40706 | 7.6 B771 CARRIER PRECIPITATION RESTART | 89248 | | | | | | | | | | 89248 |
| 40707 | 7.7 PROGRAM SUPPORT | 7323996 | 6574974 | 6548568 | 1531520 | | | | | | | 21979056 |
| 40801 | 8.1 Option Decision | 104325 | | | | | | | | | | 104325 |
| 40802 | 8.2 Buildng Readiness | 2007194 | 113429 | | | | | | | | | 2120623 |
| 40804 | 8.4 Safety Envelope | 615943 | 10223 | | | | | | | | | 626166 |
| 40805 | 8.5 Readiness Review | | 244200 | | | | | | | | | 244200 |
| 40806 | 8.6 Solution Removal | 64361 | 371424 | 377037 | | | | | | | | 812821 |
| TOTAL | L | 24301936 | 22482636 | 20600304 | 9205646 | 2332460 | | | | | | 78922984 |
| | REPORT TOTAL | 29741654 | 30903704 | 30567670 | 10445675 | 2817593 | | | | | | 104476296 |

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RFETS | PRIMAVERA PROJECT PLANNER | INTEGRATED SITE SCHEDULE

REPORT DATE 07MAR95 RUN NO. 438
17:26

COST LOADING REPORT

START DATE 01AUG94 FIN DATE 25MAR44

Total Cost - Lvl 2 - Excess Material

TOTAL USAGE FOR YEAR

DATA DATE 01OCT94 PAGE NO. 1

| ACT ID | DESC | FY 1995 | FY 1996 | FY 1997 | FY 1998 | FY 1999 | FY 2000 | FY 2001 | FY 2002 | FY 2003 | FY 2004 | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| E - NLABEXPS | | | | | | | | | | | | |
| 70506 | SNM Offsite Shipments | 1179561 | 1189112 | 1184336 | 1184336 | 262655 | | | | | | 5000000 |
| TOTAL | E | 1179561 | 1189112 | 1184336 | 1184336 | 262655 | | | | | | 5000000 |
| | REPORT TOTAL | 1179561 | 1189112 | 1184336 | 1184336 | 262655 | | | | | | 5000000 |

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# Rocky Flats
# Environmental Technology Site

## CERCLA Administrative Record

## FIGURE / TABLE / DRAWING
## TARGET SHEET

AR - 1A - A - 000357

**Legend:**

______, ______

**Detail:** Plate 1

Industrial Area IM/IRA/EP
Groundwater Monitoring
Well Locations In
The Industrial Area

# Rocky Flats
# Environmental Technology Site

# CERCLA Administrative Record

# MAP TARGET SHEET

AR - 1A - A - 000357

**Legend:**

______, ______

**Detail:** Plate 2

Industrial Area IM/IRA/IP
Verification Monitoring
Locations for
Surface Water and AIR

324

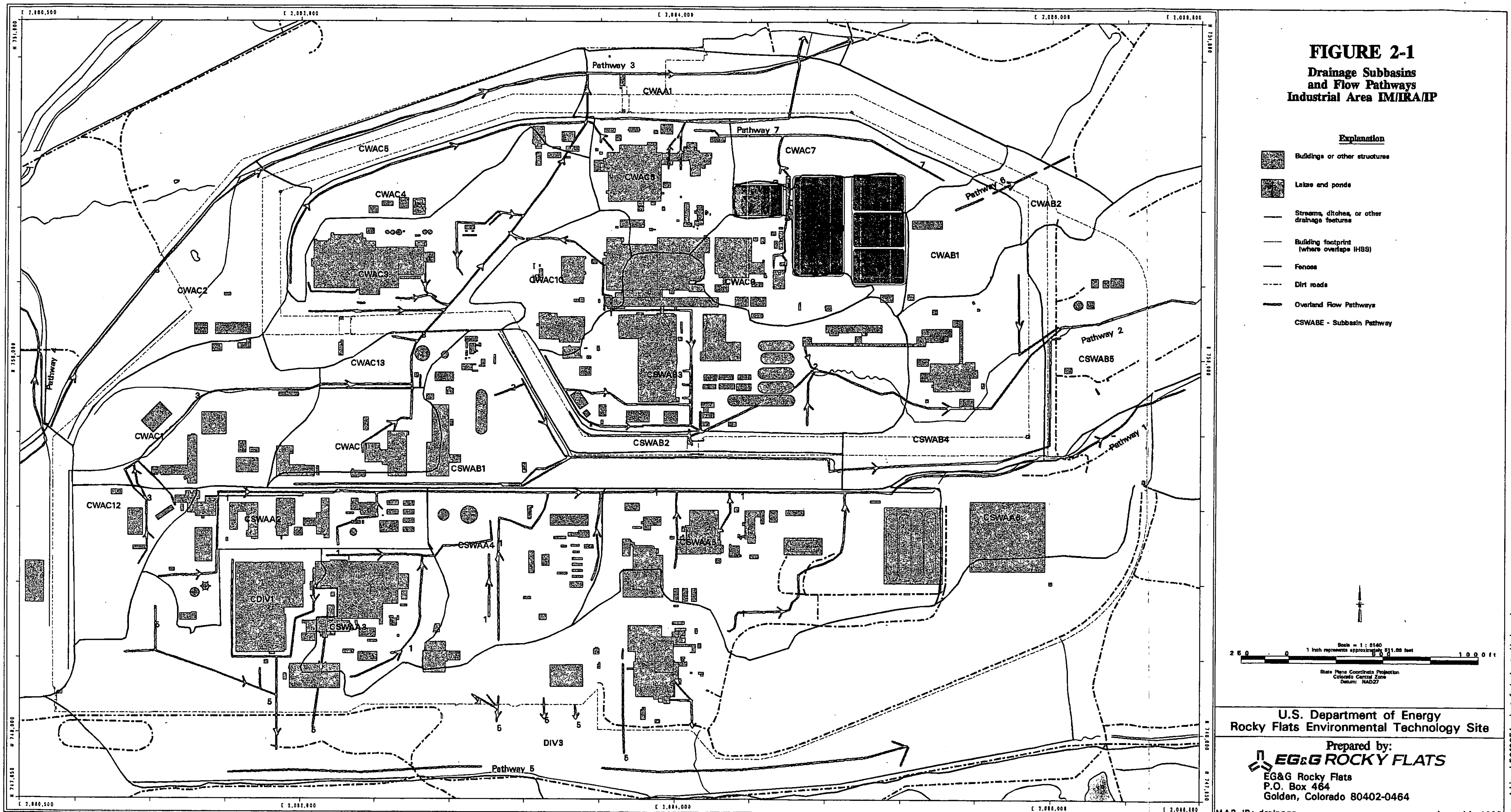
FIGURE 2-1
Drainage Subbasins and Flow Pathways Industrial Area IM/IRA/IP
Explanation
Buildings or other structures
Lakes and ponds
Streams, ditches, or other drainage features
Building footprint (where overlaps IHSS)
Fences
Dirt roads
Overland Flow Pathways
CSWABE - Subbasin Pathway
Pathway 1
Pathway 2
Pathway 3
Pathway 4
Pathway 5
Pathway 6
Pathway 7
CWAA1
CWAC1
CWAC2
CWAC3
CWAC4
CWAC5
CWAC6
CWAC7
CWAC9
CWAC10
CWAC12
CWAC13
CWAB1
CWAB2
CSWAB1
CSWAB2
CSWAB3
CSWAB4
CSWAB5
CSWAA2
CSWAA3
CSWAA4
CSWAA5
CSWAA6
CDIV1
DIV3
State Plane Coordinate Projection Colorado Central Zone Datum: NAD27
U.S. Department of Energy
Rocky Flats Environmental Technology Site
Prepared by:
EG&G ROCKY FLATS
EG&G Rocky Flats
P.O. Box 464
Golden, Colorado 80402-0464
MAP ID: drainage
June 14, 1995
/users/vkjera/s521905/projects/fmira/water/drain.aml



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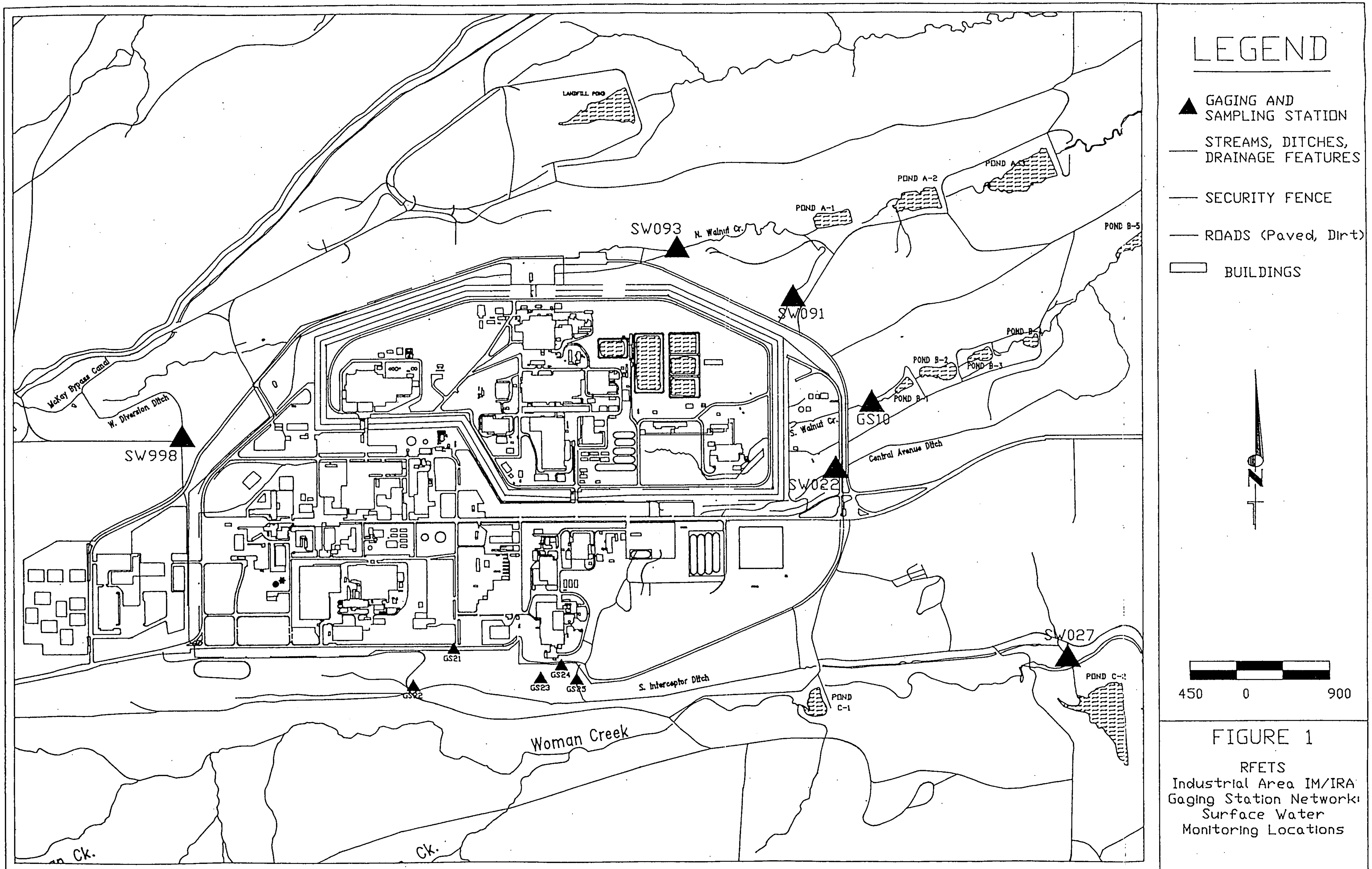
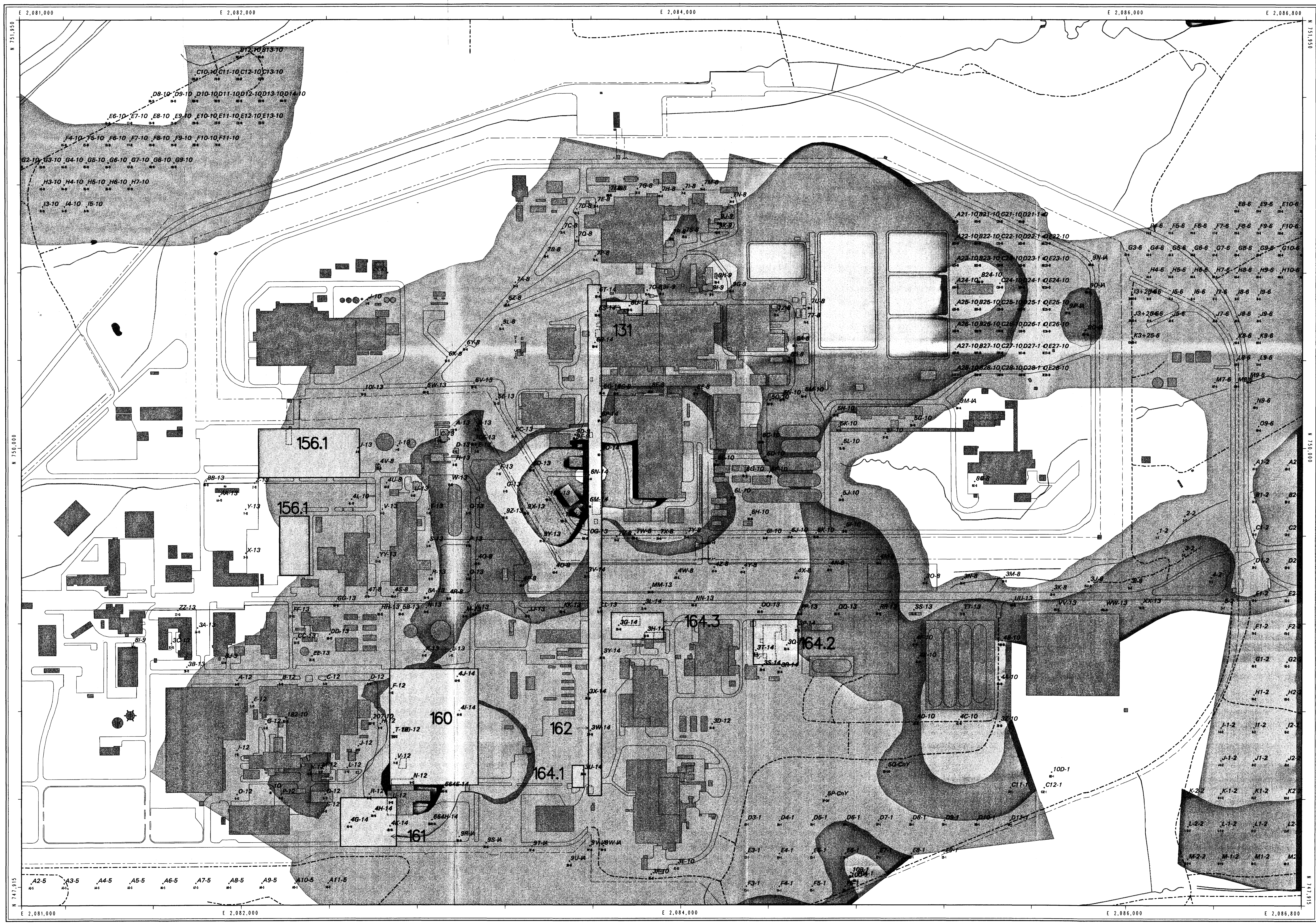



FIGURE 1

RFETS
Industrial Area IM/IRA
Gaging Station Network:
Surface Water
Monitoring Locations

216




# PLATE 1

## AMERICIUM SPECIFIC ACTIVITY MAP

### EXPLANATION

- OU 14 IHSS
- Buildings or other structures
- Lakes and ponds
- Streams, ditches, or other drainage features
- OU14 IHSS boundary
- Building footprint (where overlaps IHSS)
- Fences
- Paved roads
- Dirt roads

### HPGe Data Ranges (pCi/g)

- 0.1 - 1
- 1 - 10
- 10 - 100
- 100 - 1000
- 1000 - 10000

Notes:
HPGe = High Purity Germanium
pCi/g = picocuries per gram

200 0 400 800ft

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

Prepared by:
EG&G ROCKY FLATS

EG&G Rocky Flats
P.O. Box 464
Golden, Colorado 80402-0464

MAP ID: ou-14

ADMIN RECORD

May 17, 1995

/users/mgabriel/ou14/hpge/hpge-cn.aml

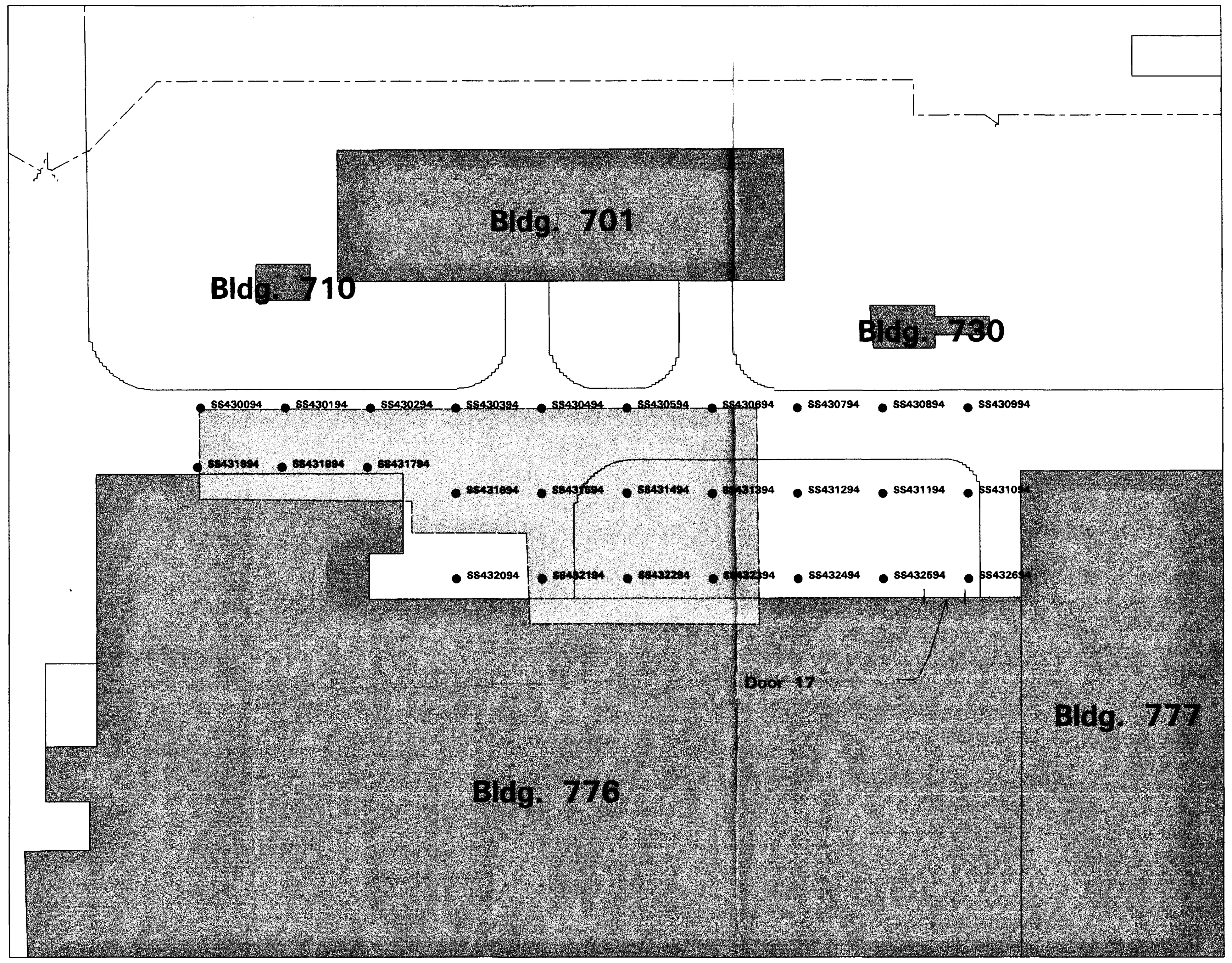
1A-A-000357, 1 of 10, Box 151

# PLATE 2

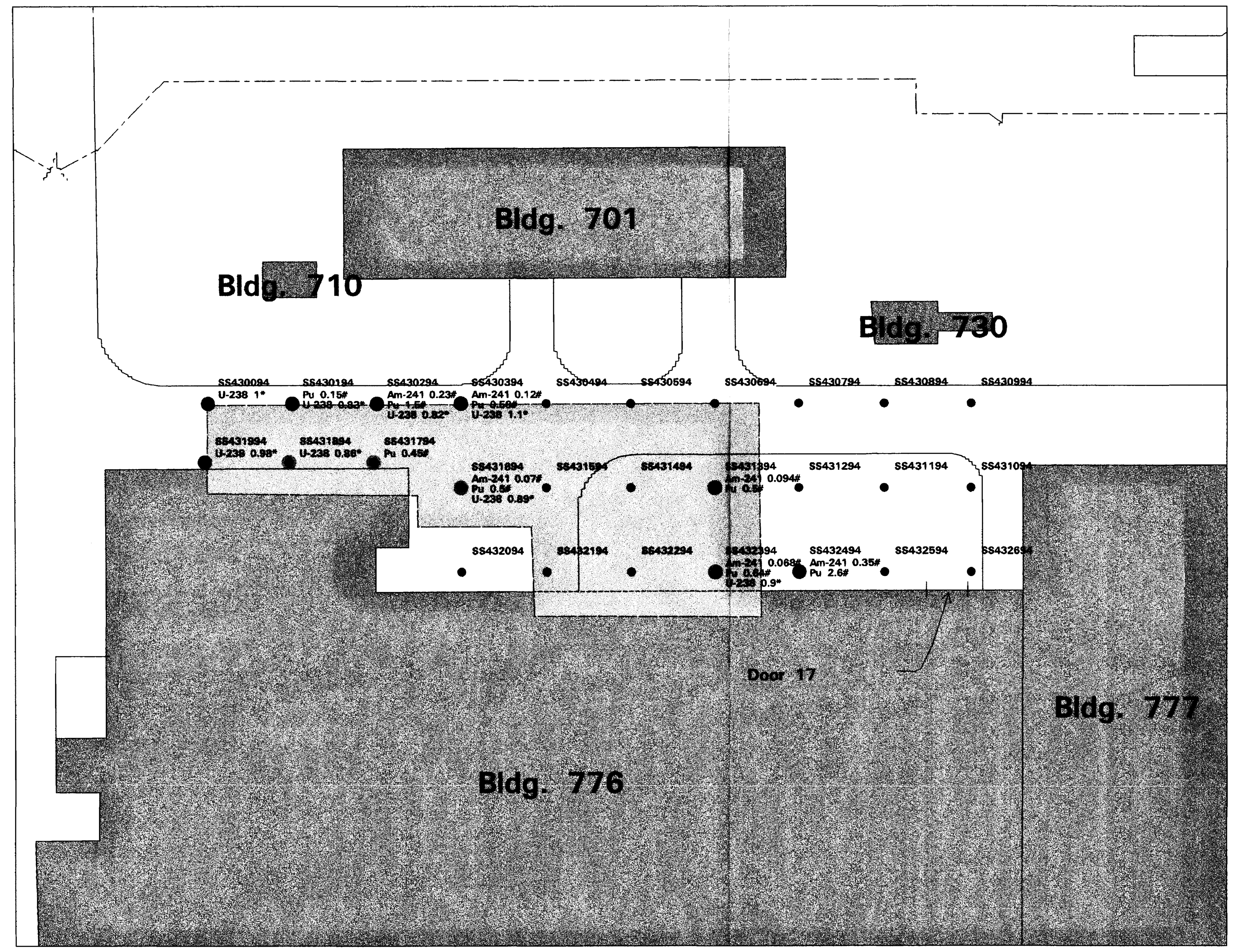
## IHSS 131

## ANALYTICAL RESULTS FOR SURFACE-SOIL SAMPLES

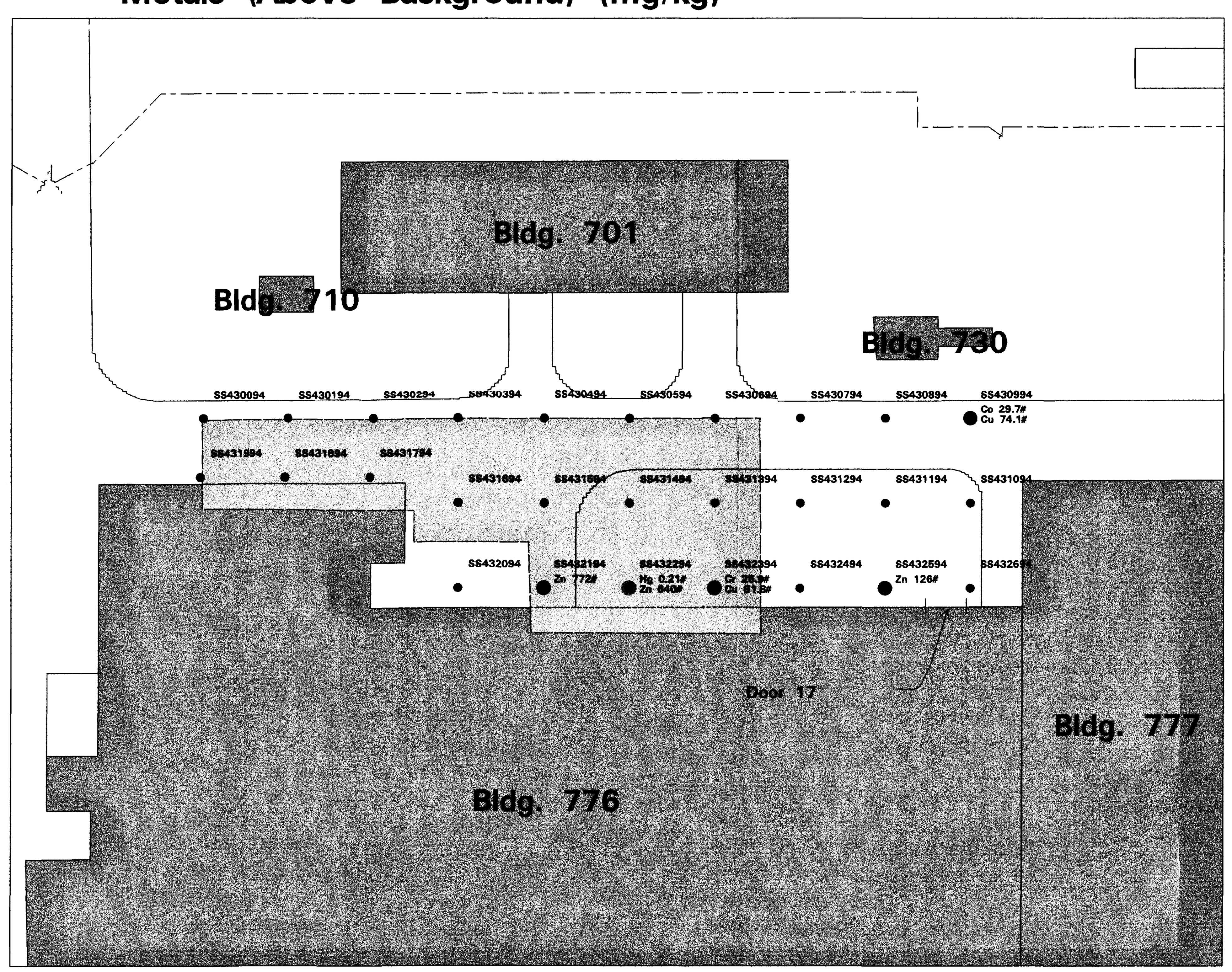
### Surface Soil Sample Locations



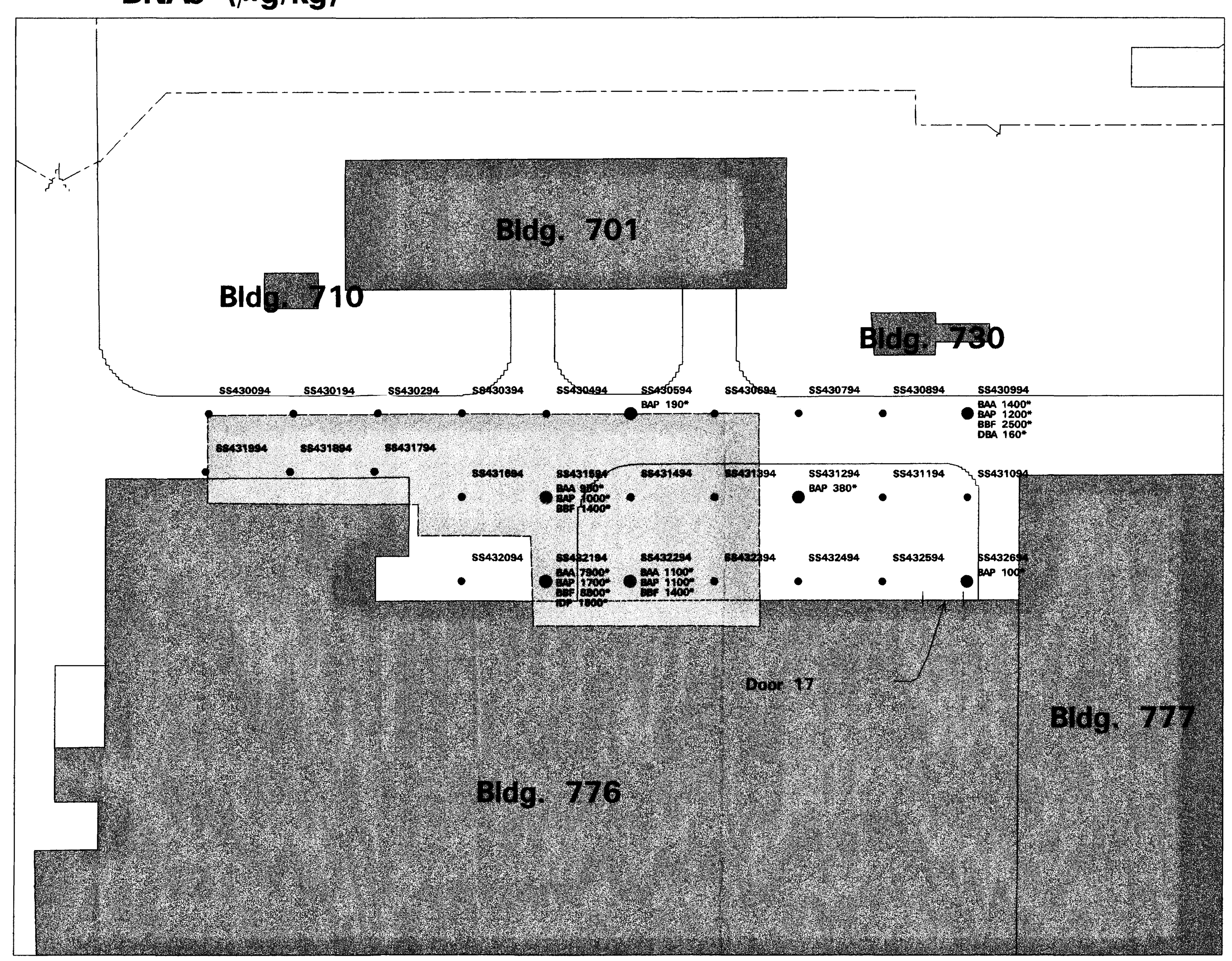

### Radionuclides (pCi/g)




### Metals (Above Background) (mg/kg)




### BNAs ($\mu$g/kg)




**EXPLANATION**

- Sample Location
- Positive Detection
- OU14 IHSS
- Buildings or other structures
- Lakes and ponds

- OU14 IHSS boundary
- Building footprint (where overlaps IHSS)
- Fences
- Paved roads
- Dirt roads

Radionuclides:

Am-241 = Americium-241
Pu = Plutonium-239/240
U-238 = Uranium-238

Metals:

Co = Cobalt
Cr = Chromium
Cu = Copper
Hg = Mercury
Zn = Zinc

BNAs:

BAA = Benzo(a)anthracene
BAP = Benzo(a)pyrene
BBF = Benzo(b)flouranthene
DBA = Dibenzo(a,h)anthracene
IDP = Indeno(1,2,3-cd)pyrene

Notes:

Analytical results are indicated by the chemical symbol, result, and threshold flag.

Flags are:
* Positive detection above PRG
\# Positive detection above background
@ Positive detection above PRG and background
BFG Base fill grab

Estimated or "J" qualified values are reported as positive detections. See associated data tables for full data presentation.

20 0 40 80ft

U.S. Department of Energy
Rocky Flats Environmental Technology Site

Prepared by:
EG&G ROCKY FLATS
EG&G Rocky Flats
P.O. Box 464
Golden, Colorado 80402-0464

MAP ID: ou-14

ADMIN RECORD

June 02, 1995

/users/mgabriel/ou14/sogplates/ss-fr.aml

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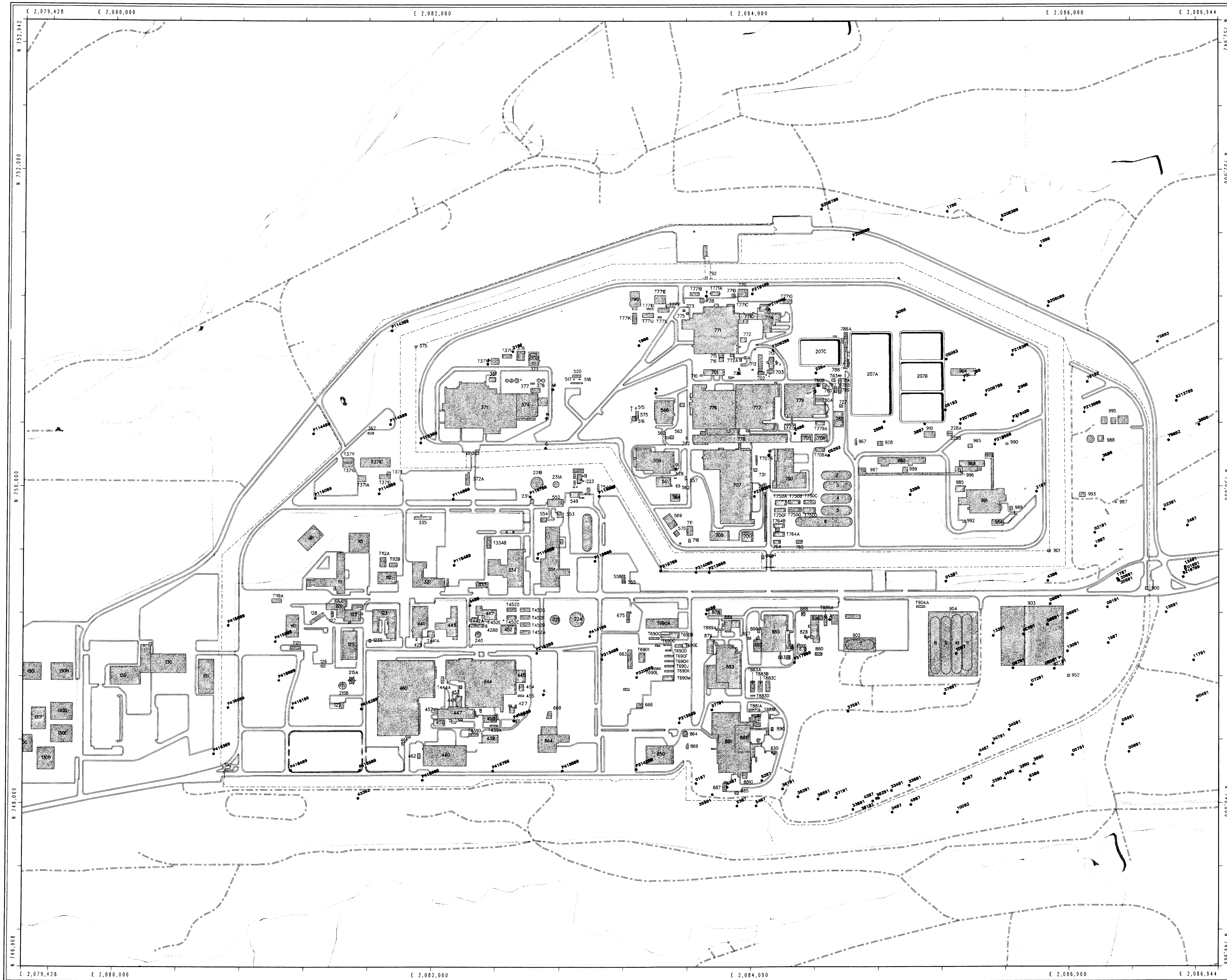


# PLATE 1

**Industrial Area IM/IRA/IP Groundwater Monitoring Well Locations in the Industrial Area**

## EXPLANATION

Buildings or other structures

Lakes and ponds

Streams, ditches, or other drainage features

Building footprint

Fences

Paved roads

Dirt roads

### Active Wells

Bedrock, Reactivated for IM/IRA

Alluvium, Reactivated for IM/IRA

Alluvium

### Inactive Wells

Alluvium

Proposed Monitoring Well

N

250 0 500 1000ft

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

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Rocky Flats Environmental Technology Site

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MAP ID: GW-WELLS

June 20, 1995

/users/vkjera/s521905/projects/gw-wellsaml

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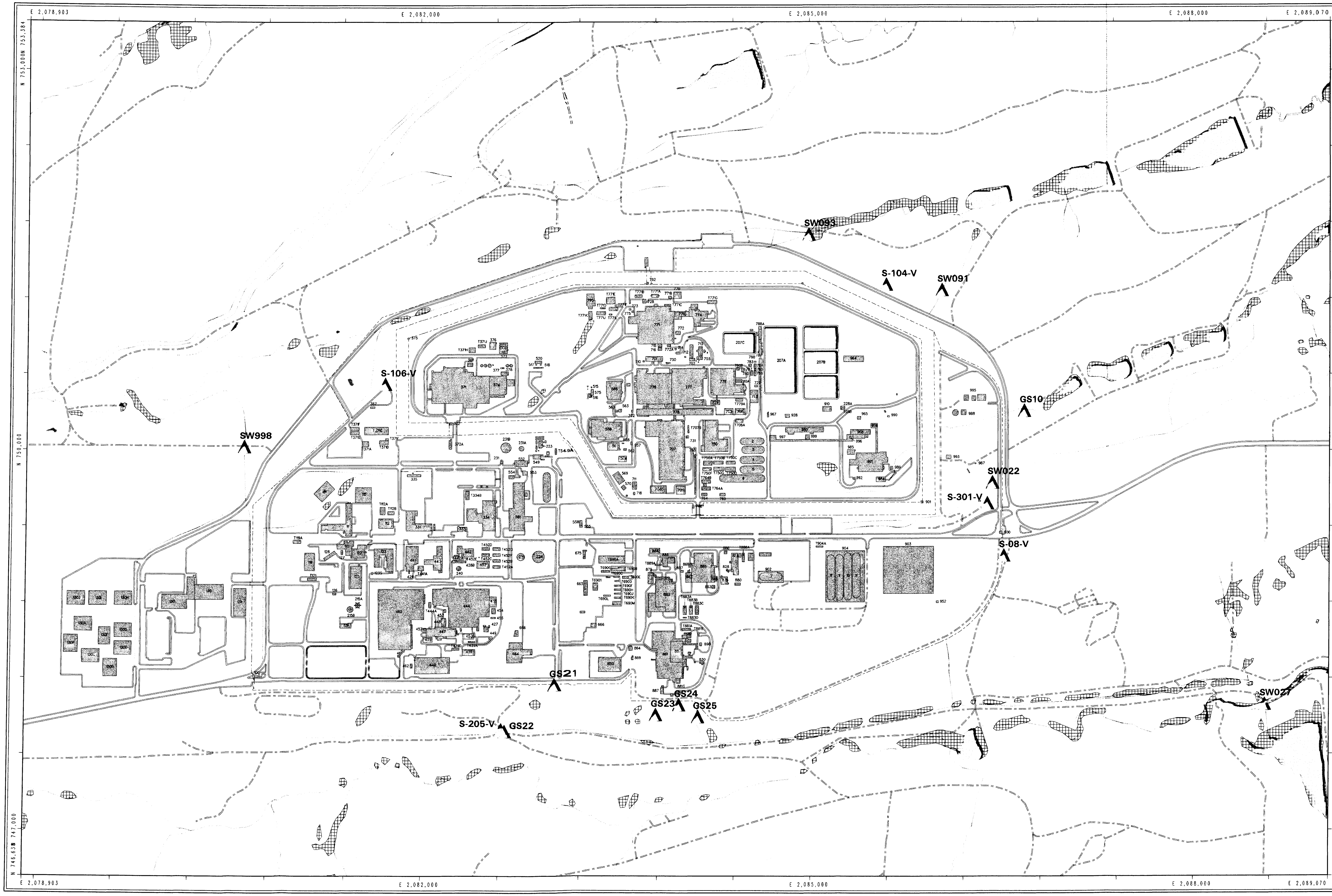


# PLATE 2

**Industrial Area IM/IRA/IP Verification Monitoring Locations for Surface Water and Air**

**EXPLANATION**

- Verification Monitoring Outfall Surface Water Sampling Locations
- Verification Monitoring Air Sampling Stations
- Buildings or other structures
- Wetlands
- Lakes and ponds
- Streams, ditches, or other drainage features
- Building footprint
- Fences
- Paved roads
- Dirt roads

Notes:

Air sampling station S-205-V and surface water sampling station GS22 are colocated.

Scale = 1 : 9900
1 inch represents 825 feet
250 0 500 1000ft

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

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MAP ID: im

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/users/vkjera/s521905/projects/im.aml

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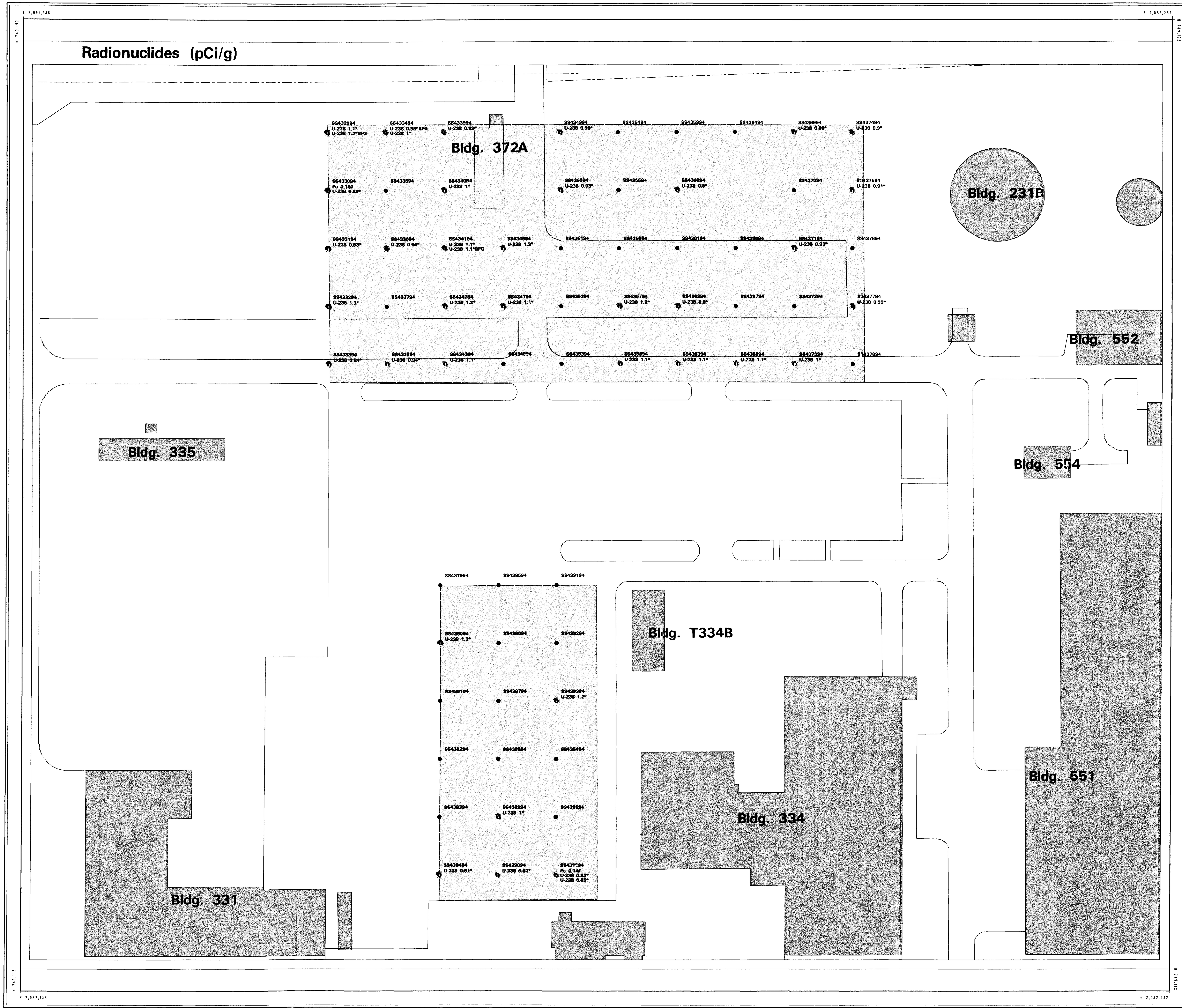


# PLATE 3

## IHSS 156.1

## ANALYTICAL RESULTS FOR SURFACE-SOIL SAMPLES

### EXPLANATION

- ● Sample Location
- ○ Positive Detection
- OU14 IHSS
- Buildings or other structures
- Lakes and ponds

- OU14 IHSS boundary
- Building footprint (where overlaps IHSS)
- Fences
- Paved roads
- Dirt roads

Radionuclides:

Pu = Plutonium-239/240
U-238 = Uranium-238

Notes:

Analytical results are indicated by the chemical symbol, result, and threshold flag.

Flags are:
- * Positive detection above PRG
- # Positive detection above background
- @ Positive detection above PRG and background
- BFG Base fill grab

Estimated or "J" qualified values are reported as positive detections. See associated data tables for full data presentation.

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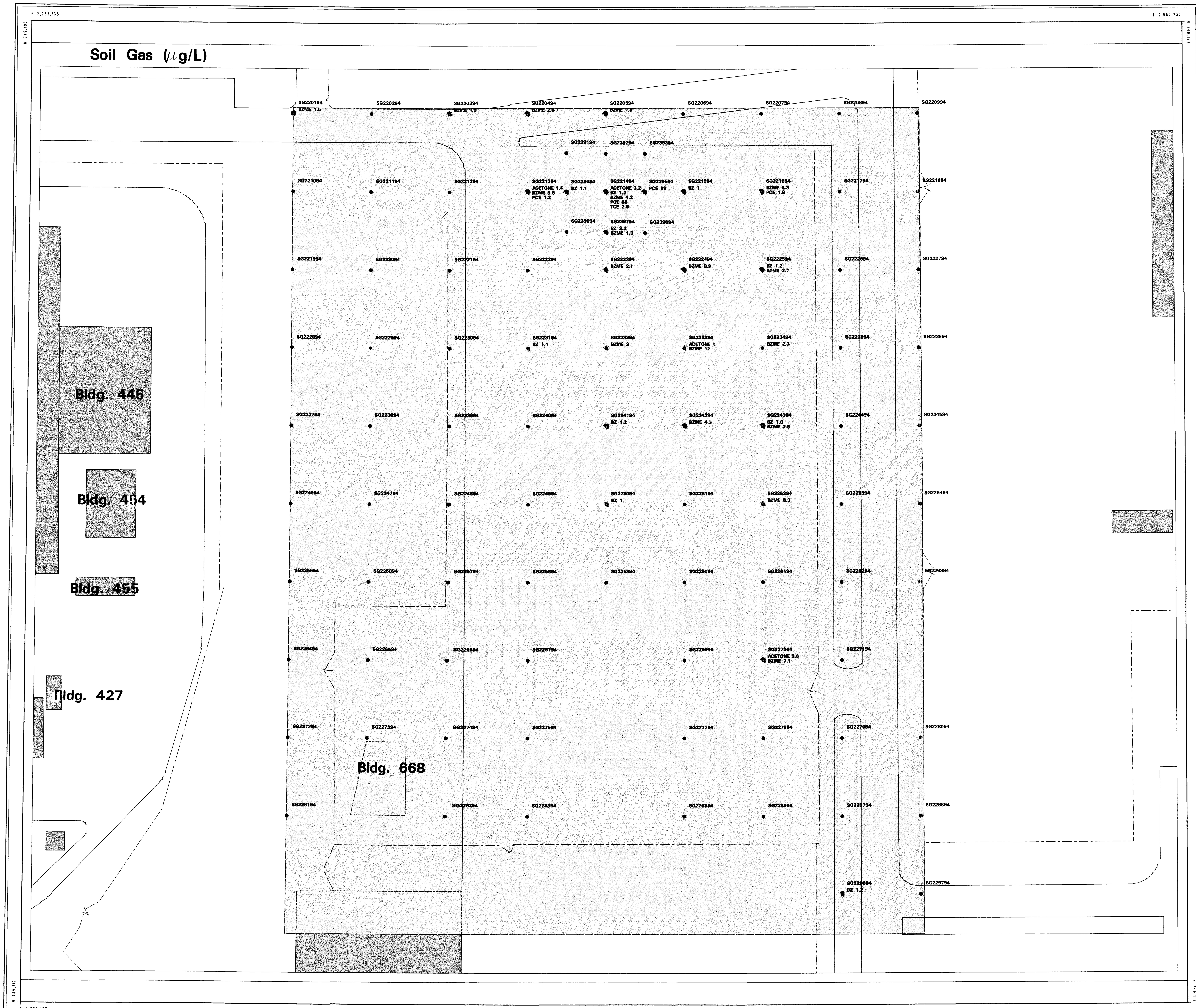

# PLATE 5

## IHSS 160

## ANALYTICAL RESULTS FOR SOIL-GAS SAMPLES

### EXPLANATION

- Soil-Gas Sample Location
- Represents the detection of a target analyte at a concentration equal to or greater than the detection limit of 1.0 micrograms per liter
- OU14 IHSS
- Buildings or other structures
- Lakes and ponds

- OU14 IHSS boundary
- Building footprint (where overlaps IHSS)
- Fences
- Paved roads
- Dirt roads

Notes:

BZ = Benzene
BZME = Toluene
PCE = Tetrachloroethene
TCE = Trichloroethene

Estimated or "J" qualified values are reported as positive detections. See associated data tables for full data presentation.

20 0 40 80ft

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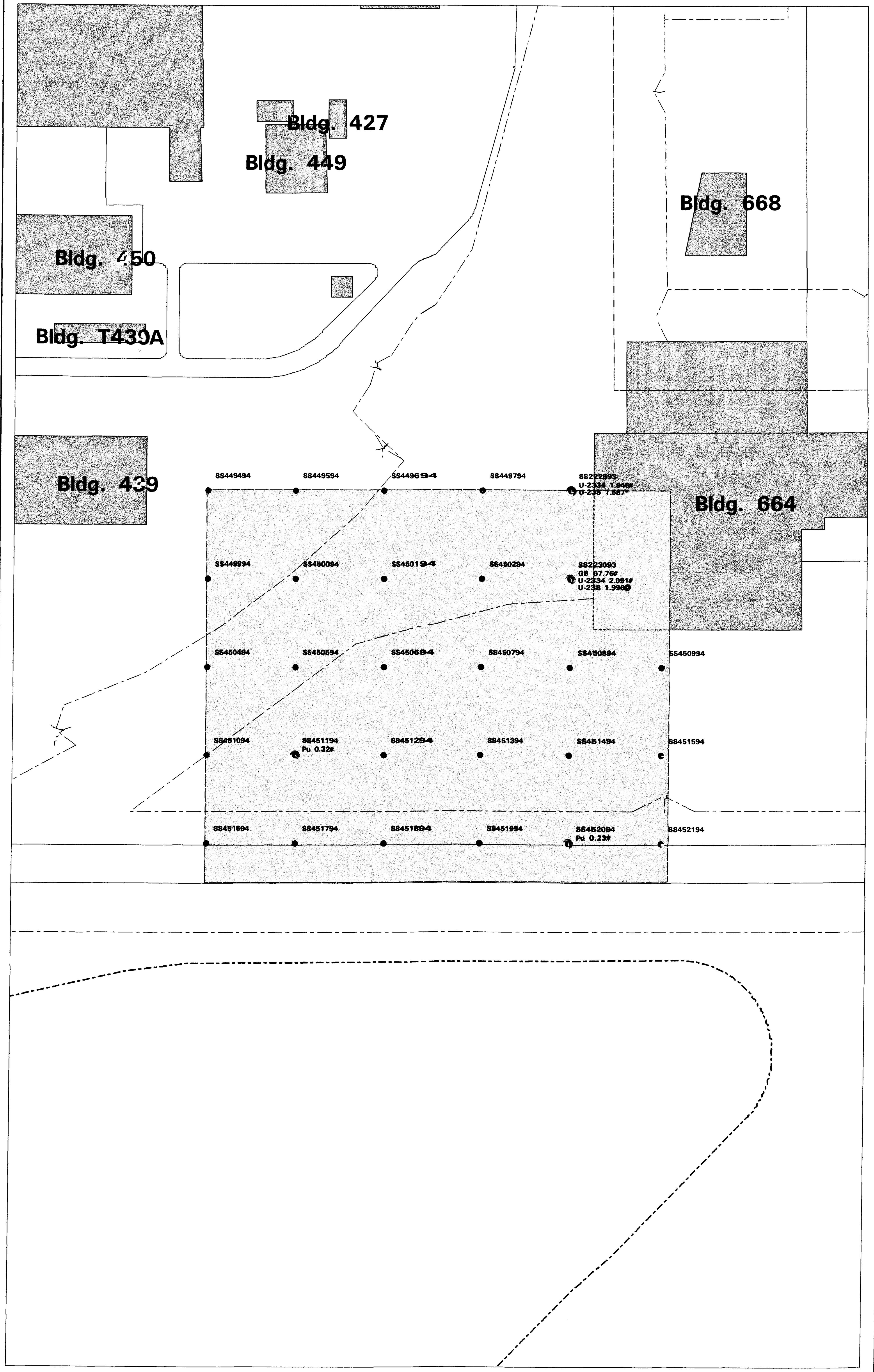
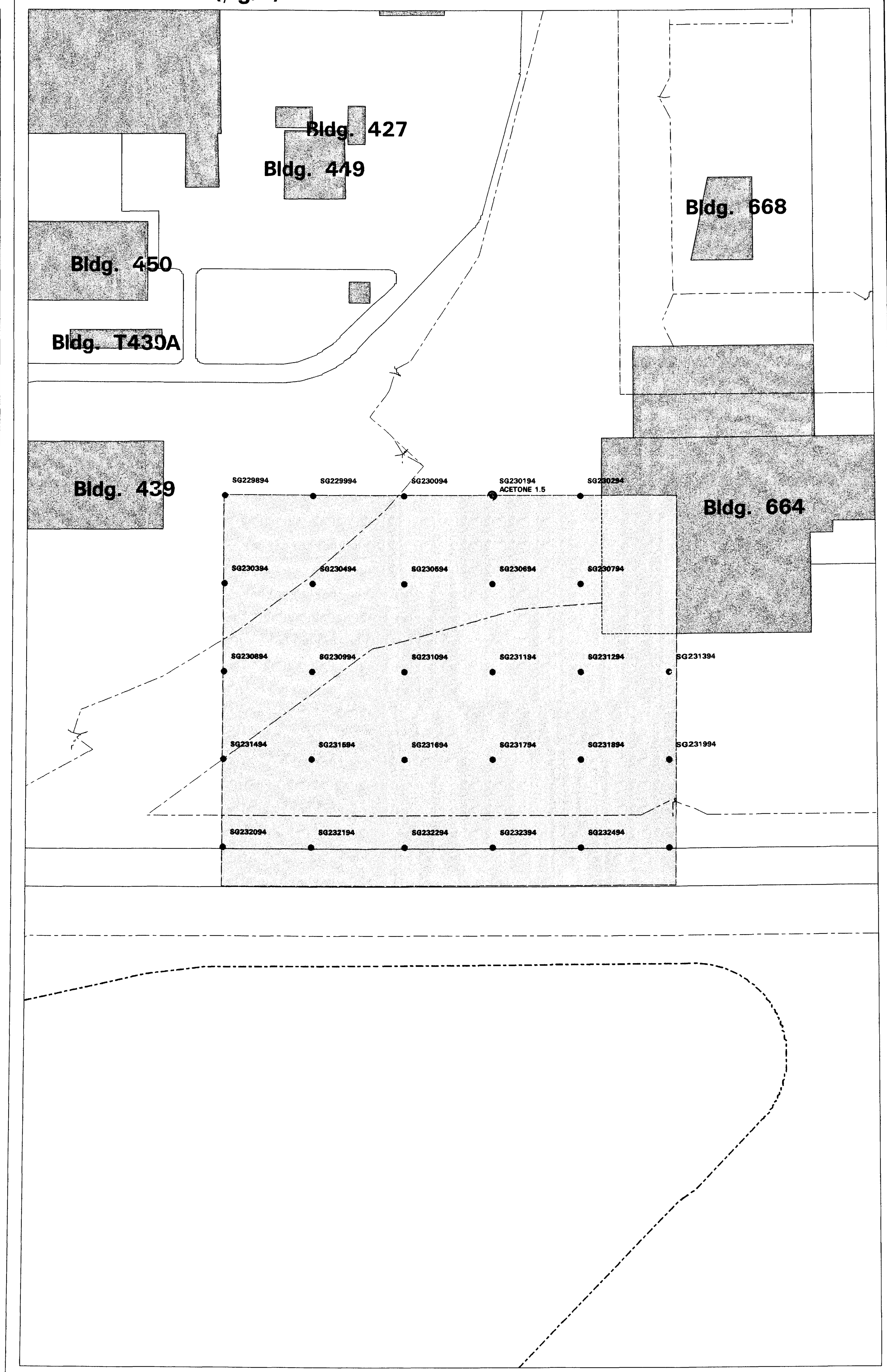
Radionuclides (pCi/g)




Soil Gas (µg/L)




# PLATE 6

## IHSS 161

## ANALYTICAL RESULTS FOR SURFACE-SOIL SAMPLES AND FOR SOIL-GAS SAMPLES

### EXPLANATION

- ● Sample Location
- ○ Analyte elevated above background
- OU14 IHSS
- Buildings or other structures
- Lakes and ponds
- OU14 IHSS boundary
- Building footprint (where overlaps IHSS)
- Fences
- Paved roads
- Dirt roads

Radionuclides:

GB = Gross Beta
Pu = Plutonium-239/240
U-2334 = Uranium-233,-234
U-238 = Uranium-238

Notes:

Estimated or "J" qualified values are reported as positive detections. See associated data tables for full data presentation.

Radiological results are indicated by the chemical symbol, result, and threshold flag.

Flags are:
* Positive detection above PRG
\# Positive detection above background
@ Positive detection above PRG and background
BFG Base fill grab

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MAP ID: ou-14

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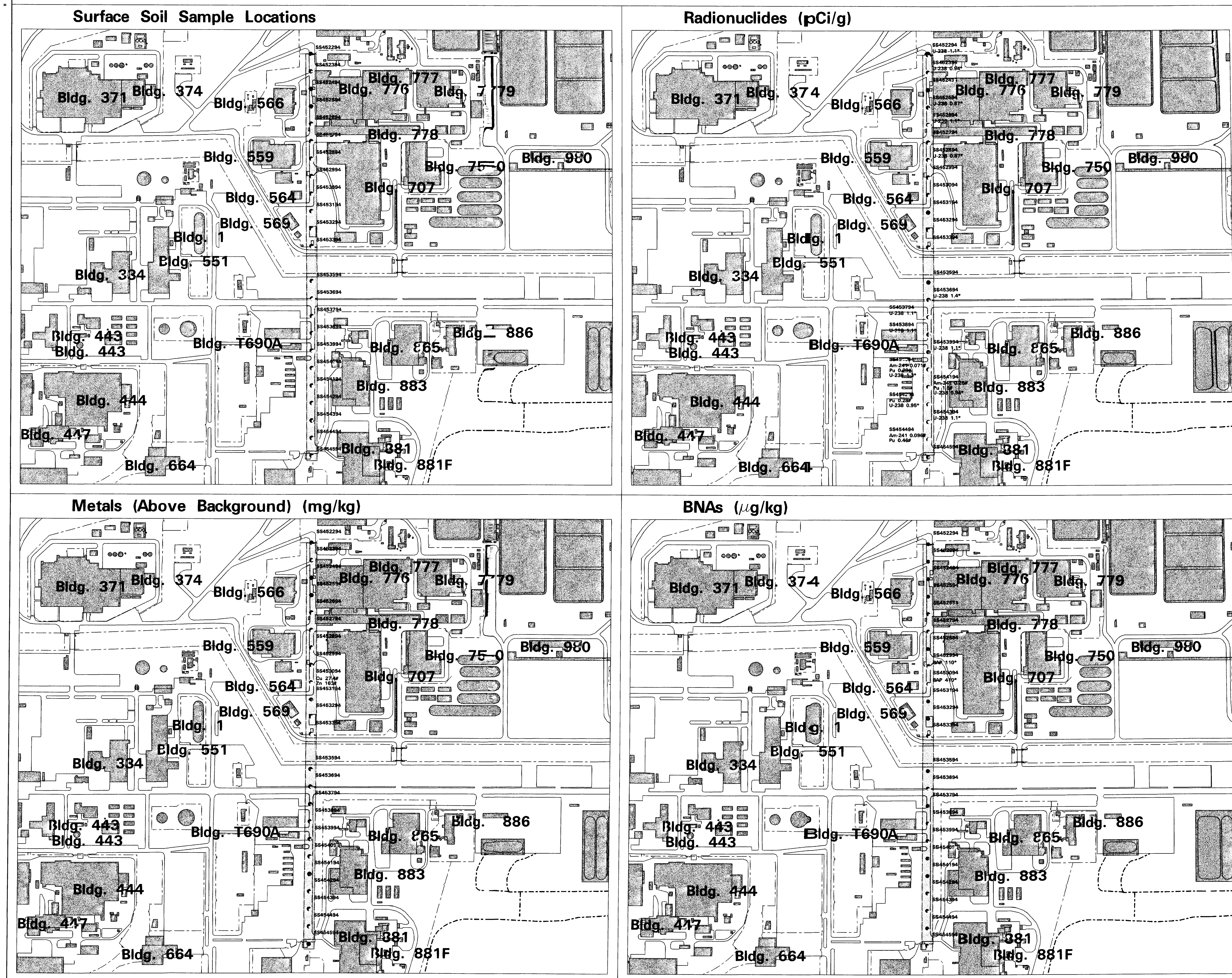
/users/mgabriel/ou14/soaplates/mg-fr.aml

# PLATE 7

## IHSS 162

## ANALYTICAL RESULTS FOR SURFACE-SOIL SAMPLES




### EXPLANATION

- ● Sample Location
- ○ Positive Detection
- OU14 IHSS
- Buildings or other structures
- Lakes and ponds
- OU14 IHSS boundary
- Building footprint (where overlaps IHSS)
- Fences
- Paved roads
- Dirt roads

Radionuclides:

Am-241 = Americium-241
Pu = Plutonium-239/240
U-238 = Uranium-238

Metals:

Cu = Copper
Zn = Zinc

BNAs:

BAP = Benzo(a)pyrene

Notes:

Analytical results are indicated by the chemical symbol, result, and threshold flag.

Flags are:
- * Positive detection above PRG
- \# Positive detection above background
- @ Positive detection above PRG and background
- BFG Base fill grab

Estimated or "J" qualified values are reported as positive detections. See associated data tables for full data presentation.

200 0 400 800ft

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MAP ID: ou-14



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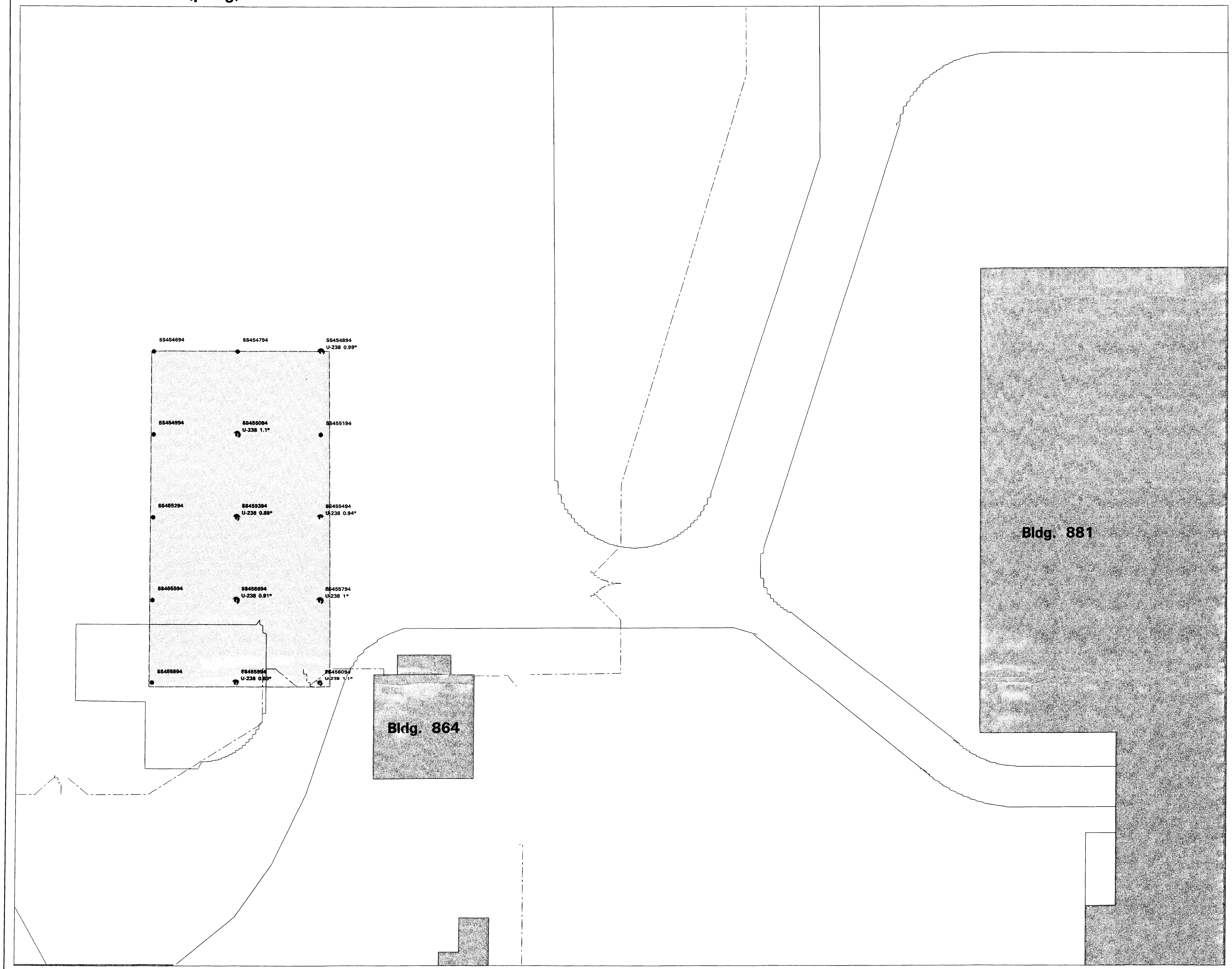
## Radionuclides (pCi/g)




# PLATE 8

## IHSS 164.1

## ANALYTICAL RESULTS FOR SURFACE-SOIL SAMPLES

### EXPLANATION

- ● Sample Location
- ○ Positive Detection
- OU14 IHSS
- Buildings or other structures
- Lakes and ponds

- OU14 IHSS boundary
- Building footprint (where overlaps IHSS)
- Fences
- Paved roads
- Dirt roads

Radionuclides:

U-238 = Uranium-238

Notes:

Analytical results are indicated by the chemical symbol, result, and threshold flag.

Flags are:
- * Positive detection above PRG
- # Positive detection above background
- @ Positive detection above PRG and background
- BFG Base fill grab

Estimated or "J" qualified values are reported as positive detections. See associated data tables for full data presentation.

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MAP ID: ou-14

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# PLATE 9

## IHSS 164.2

## ANALYTICAL RESULTS FOR SURFACE-SOIL SAMPLES

### EXPLANATION

- ● Sample Location
- ○ Positive Detection
- OU14 IHSS
- Buildings or other structures
- Lakes and ponds

- OU14 IHSS boundary
- Building footprint (where overlaps IHSS)
- Fences
- Paved roads
- Dirt roads

Radionuclides:

Am-241 = Americium-241
GA = Gross Alpha
Pu = Plutonium-239/240
U-238 = Uranium-238

BNAs:

BAP = Benzo(a)pyrene

Metals:

Ca = Calcium
Cu = Copper
Hg = Mercury
Mg = Magnesium
Na = Sodium
Sr = Strontium
Zn = Zinc

Notes:

Analytical results are indicated by the chemical symbol, result, and threshold flag.

Flags are:
* Positive detection above PRG
\# Positive detection above background
@ Positive detection above PRG and background
BFG Base fill grab

Estimated or "J" qualified values are reported as positive detections. See associated data tables for full data presentation.

20 0 40 80ft

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